

# PROJECT SPECIFICATIONS

Timberland Regional Library  
**Mountain View Library**  
**New Public Library**

10111 US Highway 12,  
Randle, WA 98377

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Timberland Regional  
**LIBRARY**



CONSTRUCTION SET  
12/27/2023

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**Johansson Wing Architects, PC**  
821 SE 14<sup>th</sup> Loop, Suite 109/PO Box 798  
Battle Ground, WA 98604  
Ph: 360-687-8379  
[www.johanssonwing.com](http://www.johanssonwing.com)

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December 27, 2023

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**SECTION 00 01 02  
PROJECT INFORMATION**

**PART 1 GENERAL**

**1.01 PROJECT IDENTIFICATION**

- A. Project Name: Timberland Regional Library - Mountain View Library, located at:  
10111 US Highway 12  
Randle, Washington 98377
- B. The Owner, hereinafter referred to as: Timberland Regional Library, TRL, or Owner.

**1.02 NOTICE TO PROSPECTIVE BIDDERS**

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

**1.03 PROJECT DESCRIPTION**

- A. Summary Project Description: Project consists of new library building and site work on a 1 acre site. Scope includes demolition of an existing single story motel building. Site work includes utilities, infrastructure, parking and circulation areas to accommodate the new library. Building construction is single story wood frame of approximately 3,300 sf.
- B. Contract Scope: Construction and demolition, under one prime Contract.

**1.04 PROCUREMENT TIMETABLE**

- A. Bid Documents Available: December 27, 2023
- B. Pre-Bid Conference: January 3, 2024.
- C. Last Request for Substitution Due: 7 days prior to due date of bids.
- D. Last Request for Information Due: 7 days prior to due date of bids.
- E. Bid Due Date: January 17, 2024, by 2 PM local time.
- F. Sub Contractors List due 1 hour after Bids are due.
- G. Bid Opening: Same day, 3 PM local time.
- H. List of Structural Steel Installers and Rebar Steel Installers is due 2 PM January 19, 2024.
- I. Notice of Intent to Award: Within 7 days after Bid due date.
- J. Notice to Proceed: Within 14 days after due date.
- K. Site/Building Available: On or around the date of Notice to Proceed.
- L. Substantial Completion Date: December 21, 2024.
- M. Acquire AHJ Temporary Certificate of Occupancy by Date: December 21, 2024.
- N. Owner may move-in and occupy the Building and Site by Date: December 21, 2024.
- O. Estimated Final Completion Date: January 1, 2025.
- P. The Owner reserves the right to change the schedule or terminate the entire procurement process at any time.

**1.05 PROCUREMENT DOCUMENTS**

- A. Availability of Documents: Complete sets of procurement documents may be obtained:
  - 1. Official Plan Distributor: J-2 Blueprint Supply Company, 8100 NE St. Johns Road, Suite 101, Vancouver, Washington. <https://plans.j2b.com> Phone: 360-696-1861.
  - 2. Reference the Advertisement for Bids included in these Specifications for document access information.

TIMBERLAND REGIONAL LIBRARY  
MOUNTAIN VIEW LIBRARY  
December 27, 2023

00 01 02  
PROJECT INFORMATION

**PART 2 PRODUCTS (NOT USED)**  
**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 00 01 03  
PROJECT DIRECTORY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 OWNER:**

- A. Name: Timberland Regional Library
1. Address Line 1: 415 Tumwater Blvd. SW.
  2. City: Tumwater.
  3. State: Washington.
  4. Zip Code: 98501.
  5. Telephone: 360 943-5001.
- B. Name: \_\_\_\_\_.
1. Address Line 1: \_\_\_\_\_.
  2. City: \_\_\_\_\_.
  3. State: \_\_\_\_\_.
  4. Zip Code: \_\_\_\_\_.
  5. Telephone: \_\_\_\_\_.

**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: Johansson Wing Architects.
    - a. Address Line 1: 950 12th Avenue, Suite 200.
    - b. City: Longview.
    - c. State: Washington.
    - d. Zip Code: 98632.
    - e. Telephone: 360 425-0000.
  2. Company Name: Johansson Wing Architects, PC.
    - a. Address Line 1: 821 SE 14th Loop, Suite 109.
    - b. City: Battle Ground.
    - c. State: Washington.
    - d. Zip Code: 98604.
    - e. Telephone: 360-687-8379.
  3. Primary Contact:
    - a. Title: Project Manager/ Principal in Charge.
    - b. Name: Lauren Johnson.
    - c. Email: lauren@johanssonwing.com.
- B. Civil Engineering Consultant:
1. Company Name: Robertson Fick Engineering.
    - a. Address Line 1: 13115 NE 4th Street, Suite 240.
    - b. City: Vancouver.
    - c. State: Washington.
    - d. Zip Code: 98684.
    - e. Telephone: 360 975-4995.
  2. Primary Contact:
    - a. Title: Project Manager.
    - b. Name: Pete Wagner.
    - c. Email: pete@robertsonfick.com .



- C. Landscape Architecture Consultant:
  - 1. Company Name: S.A.K.Land Design.
    - a. Address Line 1: PO Box 1606.
    - b. City: Brush Prairie.
    - c. State: WA.
    - d. Zip Code: 98606.
    - e. Telephone: 509 370-0915.
  - 2. Primary Contact:
    - a. Title: Landscape Architect.
    - b. Name: Stacy Kysar.
    - c. Email: saklanddesign@gmail.com.
- D. Structural Engineering Consultant:
  - 1. Company Name: PCS.
    - a. Address Line 1: 1250 Pacific Avenue, Suite 701.
    - b. City: Tacoma.
    - c. State: Washington.
    - d. Zip Code: 98402.
    - e. Telephone: 253 383-2797.
  - 2. Primary Contact:
    - a. Title: \_\_\_\_\_.
    - b. Name: Luke Heath.
    - c. Email: \_\_\_\_\_.
- E. Mechanical Engineering Consultant - Plumbing:
  - 1. Company Name: MKE & Associates.
    - a. Address Line 1: 6915 S. Macadam Avenue, Suite 200 .
    - b. City: Portland.
    - c. State: OR.
    - d. Zip Code: 97219.
    - e. Telephone: (503) 892-1188.
  - 2. Primary Contact:
    - a. Title: Engineer.
    - b. Name: John Thies.
    - c. Email: johnt@mke-inc.com.
- F. Company Name: MKE & Associates.
  - 1. Address Line 1: 6915 S. Macadam Avenue, Suite 200.
  - 2. City: Portland.
  - 3. State: OR.
  - 4. Zip Code: 97219.
  - 5. Telephone: 503 892-1188.
- G. Primary Contact:
  - 1. Title: Engineer.
  - 2. Name: Steven Ku.
  - 3. Email: steveK@mke-inc.com .
- H. Electrical Engineering Consultant:
  - 1. Company Name: MKE & Associates.
  - 2. Primary Contact:
    - a. Name: Mark Garand.
    - b. Email: MarkG@mke-inc.com.

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MOUNTAIN VIEW LIBRARY  
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00 01 03  
PROJECT DIRECTORY

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

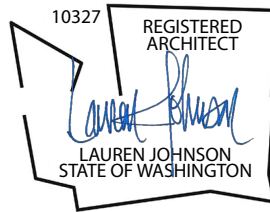
**END OF SECTION**

**SECTION 00 01 07  
SEALS PAGE - ARCHITECT**

**1.01 ARCHITECT**

- A. Johansson Wing Architects, PC.
  - 1. 821 SE 14th Loop, Suite 109
  - 2. Battle Ground, Washington 98604
  - 3. 360-687-8379

**SEAL**



**END OF SECTION**

**SECTION 00 01 07.01  
SEALS PAGE - CIVIL**

**1.01 CIVIL ENGINEER**

- A. Robertson Fick Engineering
  - 1. 13115 NE 4th Street, Suite 240
  - 2. Vancouver, WA 98684
  - 3. 360 975-4995

**SEAL**



**END OF SECTION**

**SECTION 00 01 07.03  
SEALS PAGE – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)**

**1.01 MECHANICAL ENGINEER**

- A. Mechanical Engineering Consultant:
1. Company Name: MKE & Associates.
    - a. Address Line 1: 6915 S. Macadam Avenue, Suite 200.
    - b. City: Portland.
    - c. State: OR.
    - d. Zip Code: 97219.
    - e. Telephone: 503 892-1188.
  2. Primary Contact:
    - a. Name: Stephen Ku.
    - b. Email: SteveK@mke-inc.com.

**Section: Title:**

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23 00 00	Basic HVAC Requirements
23 05 48	Vibration Isolation and Sound and Seismic Controls for HVAC Piping and Equipment
23 05 49	HVAC Seismic Restraint
23 05 53	Identification for HVAC Piping and Equipment
23 05 93	Testing, Adjusting, and Balancing for HVAC
23 07 13	Duct Insulation
23 31 00	HVAC Ducts and Casings
23 33 00	Air Duct Accessories
23 34 23	HVAC Power Ventilators
23 37 00	Air Outlets and Inlets
23 72 23	Packaged Air-to-Air Energy Recovery Units
23 81 26	Small Capacity Split-System Air Conditioners
23 82 16	Air Coils
23 83 00	Radiant Heating and Cooling Units

SEAL



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**END OF SECTION**

**SECTION 00 01 07.04  
SEALS PAGE - PLUMBING**

**1.01 MECHANICAL ENGINEER**

- A. Mechanical Engineering Consultant:
  - 1. Company Name: MKE & Associates.
    - a. Address Line 1: 6915 S. Macadam Avenue, Suite 200.
    - b. City: Portland.
    - c. State: OR.
    - d. Zip Code: 97219.
    - e. Telephone: 503 892-1188.
  - 2. Primary Contact:
    - a. Name: Stephen Ku.
    - b. Email: SteveK@mke-inc.com.

<b>Section:</b>	<b>Title:</b>
22 00 00	Basic Plumbing Requirements
22 05 19	Meters and Gages for Plumbing Piping
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 05 49	Plumbing Seismic Restraint
22 05 53	Identification for Plumbing Piping and Equipment
22 07 19	Plumbing Piping Insulation
22 10 05	Plumbing Piping
22 10 06	Plumbing Piping Specialties
22 40 00	Plumbing Fixtures

**SEAL**



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**END OF SECTION**

**SECTION 00 01 07.05  
SEALS PAGE - ELECTRICAL**

**1.01 ELECTRICAL ENGINEER**

- A. Electrical Engineering Consultant:
  - 1. Company Name: MKE & Associates.
    - a. Address Line 1: 6915 S. Macadam Avenue, Suite 200.
    - b. City: Portland.
    - c. State: OR.
    - d. Zip Code: 97219.
    - e. Telephone: 503 892-1188.
  - 2. Primary Contact:
    - a. Name: Mark Garand.
    - b. Email: MarkG@mke-inc.com.

<b>Section:</b>	<b>Title:</b>
26 00 01	Basic Electrical Materials and Methods
26 05 19	Low-Voltage Electrical Power Conductors and Cables
26 05 26	Grounding and Bonding for Electrical Systems
26 05 29	Hangers and Supports for Electrical Systems
26 05 34	Conduit for Electrical Systems
26 05 35	Surface Raceways for Electrical Systems
26 05 37	Boxes for Electrical Systems
26 05 53	Electrical Identification
26 05 73	Power System Studies
26 05 83	Wiring Connections
26 09 18	Lighting Control System
26 24 16	Panelboards
26 27 26	Wiring Devices
26 28 13	Fuses
26 28 18	Enclosed Switches
26 33 23	Central Battery Equipment
26 51 00	Lighting

SEAL



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**END OF SECTION**

**SECTION 00 01 07.06  
SEALS PAGE - COMMUNICATIONS**

**1.01 ELECTRICAL ENGINEER**

- A. Electrical Engineering Consultant:
  - 1. Company Name: MKE & Associates.
    - a. Address Line 1: 6915 S. Macadam Avenue, Suite 200.
    - b. City: Portland.
    - c. State: OR.
    - d. Zip Code: 97219.
    - e. Telephone: 503 892-1188.
  - 2. Primary Contact:
    - a. Name: Mark Garand.
    - b. Email: MarkG@mke-inc.com.

**Section: Title:**

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27 05 28	Pathways for Low Voltage Systems Cabling
27 10 00	Structured Cabling

**SEAL**



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**END OF SECTION**



**SECTION 00 11 13  
ADVERTISEMENT FOR BIDS**

**1.01 NOTICE TO BIDDERS**

- A. Notice is hereby given, the Timberland Regional Library , 415 Tumwater Blvd. SW, Tumwater, Washington, is soliciting competitive bids from responsible contractors for the construction of the new Mountain View Library project located in Randle, Washington, and will receive base Bids until 2:00 p.m. (PDT), on January 17, 2024 at the Timberland Regional Library located at 415 Tumwater Blvd. SW, Tumwater, Washington.
- B. The Project consists of the construction of new Public Library building and 1 acre site consisting of approximately 3,400 s.f. single story wood frame construction and sitework development with vehicle circulation, parking, pedestrian circulation, utilities and areas of new landscape and other undisturbed landscape site areas.
- C. Submission of Alternate Bids and List of HVAC, Plumbing and Electrical subcontractors is due by 3:00 pm on January 17, 2024 at the same location listed above.
- D. List of Structural Steel Installers and Rebar Installers is due by 2:00 p.m. on January 19, 2024 at the same location listed above.
- E. The Base Bids and any Alternate Bids will be opened and read aloud soon after Bid closing. All interested persons are entitled to attend the Bid opening.
  1. Bids will be received as follows: General Contract consisting primarily of New Building Construction and Site Work. All Work will be under a single-prime Contract(s).
  2. Contract documents will be available, and may be examined at the following:
    - a. Southwest Washington Contractors Association, 7017 NE Highway 99, Suite 214, Vancouver, Washington 98665. [www.swca.org](http://www.swca.org)
    - b. J-2 Blue Print Supply Company, 8100 NE St. Johns Road, Suite B-101, Vancouver, WA, 360-696-1861; <https://plans.j2b.com>.
      - 1) Prospective bidders will be required to sign in as an account manager to have access to the project documents. Contact J2 Blue Print Plan Center regarding questions or setting up an account or viewing the documents. Printed sets or sheets may be purchased directly from printer.
  3. This project is considered a Public Works project. Attention of Bidders is called to State of Washington statutes, regulations and rules pertaining, but not limited to, the following public Works projects: non-discrimination in employment and facilities; rates of payment for wages and fringe benefits to Workers; employment of excess numbers of Workers who are non-residents of the State of Washington; Bid Form; bonds, Contracts and certificates; restrictions of lien, taxes and retainage; and barrier-free facilities for the handicapped.
  4. The Owner reserves the right to waive any informalities and to reject any or all Bids.
  5. No Bidder may withdraw or modify its Bid after the time set for the Bid opening until after 45 calendar days receipt of Bids.
  6. There will be a Non-Mandatory Pre-Bid conference on January 3, 2024, at 2:00 pm at the Project Site.
  7. Advertisement Publish Dates:
    - a. Seattle Daily Journal of Commerce: December 27, 2023 and January 3, 2024.
    - b. The Olympian, Olympia, Washington: December 27, 2023 and January 3, 2024.
    - c. The News Tribune, Tacoma, WA: December 27, 2023 and January 3, 2024.
    - d. The Chronicle, Centralia, WA: December 27, 2023 and January 3, 2024.
    - e. The East County Journal, Morton, WA: December 27, 2023 and January 3, 2024
    - f. Shelton-Mason County Journal, Shelton, WA: December 27, 2023 and January 3, 2024.

**END OF SECTION**

**SECTION 00 21 13  
INSTRUCTIONS TO BIDDERS**

**INSTRUCTIONS TO BIDDERS**

**1.01 DEFINITIONS**

- A. All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

**1.02 BIDDERS REPRESENTATIONS**

- A. The Bidder, by making its Bid, represents that:
1. The Bidder has read and understands the Bidding Documents, and its Bid is made in accordance with them.
  2. The Bidder has attended the pre-Bid meeting(s) as required by the Bidding Documents.
  3. The Bid is based upon the materials, systems, and equipment required by the Bidding Documents and is made without exception.
  4. The Bidder will perform with its own forces at least the percentage of the Work required by the Bidding Documents.
  5. The Bidder has checked its copies of the Project Manual and Drawings, and all supplemental documents included as part of the Bid information with their respective Table of Contents and List of Drawings to ensure the Project Manual and Drawings are complete.
  6. The Bidder has examined and coordinated all Drawings and Contract Documents including the Specifications for any other Contracts to be awarded separately from, but in connection with, the Work being Bid upon, and items provided and/or assigned by the Owner to the Contractor to be incorporated in the Work, so that the Bidder is fully informed as to conditions affecting the Work under the Contract being Bid upon.
  7. The Bidder has carefully examined the Bidding Documents, Contract Documents, Specifications, Supplemental Information and the Project site, including any existing buildings, and is confident regarding the following:
    - a. the nature, location, character, quality and quantity of the Work.
    - b. the labor, materials, equipment, goods, supplies, Work, services and other items to be furnished.
    - c. the conditions and other matters that may be encountered at the project site or affect performance of the Work or the cost or difficulty thereof, including but not limited to those conditions and matters affecting: transportation, access, disposal, handling and storage of materials, equipment and other items; availability and quality of labor, water, electric power and utilities; availability and condition of roads;
    - d. climatic conditions and seasons; physical conditions at the Project site and the surrounding locality, topography and ground surface conditions.
    - e. equipment and facilities needed preliminary to and at all times during the performance of the Work. The failure of the Bidder to fully acquaint itself with any applicable condition or matter shall not in any way relieve the Bidder from the responsibility for performing the Work in accordance with, and for the Contract Sum and within the Contract Time provided for in the Contract Documents.
    - f. For Bidders and other entities wishing to inspect the site of the Work (except official pre-Bid conference) shall contact the party listed in Section 00 01 03, Project Directory.
  8. Bidders may attend any or all meetings scheduled by the Owner or the Architect during the Bidding period. Scheduled Pre-Bid Conference will be listed in Section 00 11 13, Advertisement for Bids.

**1.03 BIDDING DOCUMENTS**

- A. Copies:
1. Bidders may obtain complete sets of the Bidding Documents (Procurement Requirements, Drawings, Project Manual and Addenda) from locations designated in the Advertisement

- or Invitation to Bid.
2. Bidding Documents are available directly to Sub-Bidders or others either online or by direct purchase at the locations designated in the Advertisement for Bids and the Invitation to Bid.
  3. Bidders shall use complete sets of Bidding Documents in preparing Bids and are solely responsible for utilizing established plan holder identification processes to obtain updated Bid information; neither the Owner nor the Architect assumes any responsibility for errors or misinterpretations resulting from the use of incomplete and/or superseded sets of Bidding Documents. Printed copies of plans take precedence over any on-line images.
  4. The Owner and/or the Architect make copies of the Bidding Documents available on the above terms only for the purpose of obtaining Bids on the Work and do not confer a license or grant permission for any other use.
- B. Interpretation or Correction of Bidding Documents:
1. Bidders shall carefully study and become familiar with the Bidding Documents, and with other Work being Bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall promptly notify the Architect of any ambiguity, inconsistency, or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.
  2. All Bidders and Sub-Bidders shall thoroughly familiarize themselves with specified products and installation procedures and submit to the Architect any objections (in writing) within timelines defined in Project Information Section.
  3. Bidders and Sub-Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect by the date listed in the Project Information Section.
  4. The submittal of the Bid constitutes acceptance of products and procedure specified as sufficient, adequate and satisfactory for completion of the Contract.
  5. Any interpretation, correction or change of the Bidding Documents will be made by written Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.
  6. Reference in the singular to an article, device or piece of equipment shall include as many of such articles as are indicated in the Contract Documents or as are required to complete the installation.
  7. Bidders shall assume that the exact locations of underground or hidden utilities may be somewhat different from any location indicated in the surveys or Contract Documents.
  8. The Contract Documents may be divided into parts, divisions, and sections for convenient organization and reference. Generally, there has been no attempt to divide the Specification sections into Work performed by the various building trades, any Work by separate Contractors, or any Work required for separate facilities in or phases of the Project.
- C. Pre-Bid Substitutions:
1. See Section 01 25 00, Substitution Procedures for requirements.
- D. Addenda:
1. All Addenda will be written. Addenda will be available in electronic format by J2 Blueprint to those who have registered to receive Bidding documents.
  2. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
  3. Each Bidder shall ascertain prior to submitting its Bid that it has received all Addenda issued, and it shall acknowledge their receipt on the Bid Form.

#### **1.04 BIDDING PROCEDURE**

- A. Preparation of Bids:
1. Submit Bids on forms identical to the form included with the Bidding Documents.

2. Fill in all blanks on the Bid form by typewriter or manually in ink.
  3. Express proposed Sums on the Bid form. Sums shall be expressed in both words and figures. In case of discrepancy between the two, the amount written in figures shall govern. Portions of the Bid form may require the addition of component Bids to a total or the identification of component amounts within a total. In case of discrepancy between component amounts listed and their sum(s), the component amounts listed shall govern.
  4. Interlineation, alteration or erasure must be initialed by the signer of the Bid.
  5. Include Bids for requested Alternates. If no change in the Base Bid is required, enter "No Change." If there is no entry, it will be presumed that there is no change in the Base Bid.
  6. Where two (2) or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the Bid security, state Bidders refusal to accept award of less than the combination of Bids stipulated by Bidder. The Bidder shall make no additional stipulations on the Bid form nor qualify its Bid in any other manner.
  7. Each copy of the Bid shall include the legal name of the Bidder and a statement describing the Bidder as a sole proprietor, a partnership, a joint venture, a corporation, or another described form of legal entity. A Bid submitted by a corporation shall further indicate the state in which the corporation is registered with affixed corporate seal. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a Contract. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.
  8. Include taxes imposed by law in the Bid, EXCEPT STATE AND LOCAL SALES TAX.
  9. The Bid Form may contain, for the Owner's accounting purposes only, a breakdown of some or all of the components included in the Base Bid.
- B. Bidder's Percentage:
1. As noted on the Bid form, the Bidder is certifying that the Bidder will perform with its own forces, excluding General Conditions, at least ten percent (10%) of the Work.
- C. Listing Proposed Subcontractors:
1. The Bid Form may include a requirement that certain Sub Contractors be listed, and the list submitted to the Owner. In these circumstances, the Bidder must name the Subcontractor with whom the Bidder, if awarded the Contract, will subcontract directly i.e., not Sub-Subcontractors) for performance of the Work of: Should alternate Bids require different named Subcontractors, the Bidder shall identify the alternate Subcontractors and the affected portion of the Work. List the following proposed Subcontractors:
    - a. HVAC (heating, ventilation and air conditioning),
    - b. Plumbing as described in RCW 18.106,
    - c. Electrical Work as described in RCW 19.28,
    - d. Structural Steel installation work,
    - e. Foundation Reinforcing installation work, and
    - f. Any other categories of Work listed on the Subcontractor listing form.
  2. The Bidder shall not list more than one (1) entity for a particular category of Work identified, unless a Subcontractor varies with an Alternate Bid, in which case the Bidder shall identify the Subcontractor to be used for the Alternate and the affected portion of the Work and otherwise make its Bid clear as to which Subcontractor shall be utilized depending upon the selection of alternates.
  3. In the event the Bidding Documents indicate a second submittal time for receipt of alternate Bids, and no additional Subcontractors are listed with such alternate Bids, the Owner will consider that there is no change in the Subcontractors from those listed with the Base Bid.
  4. If there is no Work to be performed by a HVAC, plumbing, electrical, or other Subcontractor category identified on the Bid form, the Bidder shall insert "None" or "N/A" on the Bid Form. If a category is left blank that shall indicate that the Bidder believes that there is no Work to be performed by that trade.
  5. The Bidder, if awarded the Contract, will subcontract with the listed Subcontractor for performance of the portion of the Work designated on the Bid Form, subject to the

- provisions of the Contract for Construction and RCW 39.30.060. The Bidder shall not substitute a listed Subcontractor in furtherance of Bid shopping or Bid peddling.
6. In accordance with RCW 39.30.060, failure of a Bidder to submit as part of the Bid the names of such proposed heating, ventilation and air conditioning, plumbing, and electrical Subcontractors or to name itself to perform such Work or the naming of two or more Subcontractors to perform the same Work shall render the Bidder's Bid nonresponsive and, therefore, void.
  7. If a listed Subcontractor is unable to comply with bond requirements of the Bidding Documents or other requirements of the Contract Documents, the Owner may require the Bidder to replace the Subcontractor with a Subcontractor acceptable to the Owner at no change in the Contract Sum or Time.
  8. Subcontractors shall meet Contractual and technical qualifications standards, and provide specialized certification, licensing, and payment and performance bonding where specified.
- D. Bid Security:
1. Each Bid shall be accompanied by a Bid security equal to five percent (5%) of the Base Bid and alternates, if any with each Bid. The Bid security constitutes a pledge that the Bidder will execute the Contract with the Owner in the form provided, in a timely manner, and on the terms stated in the Bid and will furnish in a timely manner the payment and performance bonds, certificates of insurance, Contractor's Construction Schedule, and other documents required in the Contract Documents. Should the Bidder fail or refuse to execute the Contract or fail to furnish such documents, the amount of the Bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.
  2. The Bid security shall be in the form of a certified or bank cashier's check payable to the Owner or a Bid bond executed by a bonding company licensed in the State of Washington on a Public Works Bond or equivalent form.
  3. The Owner will have the right to retain the Bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and payment and performance bonds have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn, or (c) all Bids have been rejected.
- E. Statement of Noncollusion Submission and Acknowledgement:
1. See Section 00 45 19, Statement of Noncollusion. Submit fully executed, signed, and dated official form with Bid.
- F. Statement of Nonsegregated Facilities Submission and Acknowledgement:
1. See Section 00 45 33, Statement of Nonsegregated Facilities. Submit fully executed, signed, and dated official form with Bid.
- G. Submission of Bids:
1. Submit the Bid, the Bid security and other required Bid documents in a sealed opaque envelope. Address the envelope to the party specified in the Advertisement for Bids and identify 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 of the envelope.
  2. Bids shall be deposited at the designated location prior to the time and date for receipt of Bids indicated in the Advertisement for Bids, or any extension thereof made by Addendum. Bids received after the time and date for receipt of Bids may be opened, retained unopened, or returned (open or unopened), all at the discretion of the Owner.
  3. The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.
  4. Oral, telephonic, telegraphic, facsimile, or electronic Bids are invalid and will not be considered.
  5. By submission of a Bid, the Contractor attests that:

- a. the Bidders understanding of the proposed project, including existing conditions, is adequate and that the Bidders proposal is sufficient to cover the intent of the Project.
  - b. with exception for Owner or Architect initiated changes, the Bidder intends to maintain costs within the Bid price.
  - c. the Bidding Documents are of sufficient quality on which to affix their price and on which construction may be accomplished.
  - d. the Bidder has indicated on the Bid form receipt of all addenda, has had the opportunity to seek clarification and has received such clarifications.
- H. Modification or Withdrawal of Bid:
1. Each Bidder agrees that a Bid may not be modified, withdrawn or canceled by the Bidder during a forty-five-day (45-day) period following the time and date designated for the receipt of Bids.
  2. Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder on or before the date and time set for receipt of Bids. The notice shall be so worded as not to reveal the amount of the original Bid.
  3. Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids provided they are then fully in conformance with these Instructions to Bidders.
  4. Bid security shall be in an amount sufficient for the Bid as modified or resubmitted.
  5. Bidders and their proposed Subcontractors shall be registered and shall hold such licenses as may be required by the laws of Washington, including RCW 18.27 for the performance of the Work specified in the Contract Documents.
  6. Bids must be based upon the materials, systems and equipment described and required by the Bidding Documents, and terms and conditions in the Contract Documents, without exception.

#### **1.05 CONSIDERATION OF BIDS**

- A. Opening of Bids:
1. Unless stated otherwise in the Advertisement for Bids, the properly identified Bids received on time will be opened publicly and will be read aloud. An abstract of the Base Bids and Alternate Bids, if any, will be made available to Bidders.
- B. Rejection of Bids:
1. The Owner shall have the right but not the obligation to reject any or all Bids for any reason or for no reason, to reject a Bid not accompanied by required Bid security or by other data required by the Bidding Documents, or to reject a Bid which is in any way incomplete or irregular.
- C. Acceptance of Bid (Award):
1. The Owner intends (but is not bound) to award a Contract to the lowest responsible and qualified Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities or irregularities in any Bid(s) received and to accept the Bid which, in the Owners judgment, is in the Owners best interests.
  2. 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 low Bidder on the basis of the sum of the Base Bid and Alternates accepted.
- D. Bid Protest Procedures:
1. A Bidder protesting for any reason the Bidding Documents, a Bidding procedure, award of the Contract or any other aspect arising from or relating in any way to the Bidding shall submit a written protest to be filed with the Owner within two (2) business days of the event giving rise to the protest and, in any event, no later than three business days after the date upon which Bids are opened. The written protest shall include the name of the protesting Bidder, a detailed description of the specific factual and legal grounds for the

protest, copies of supporting documents, and the specific relief requested. The written protest shall be delivered to:

- a. Contact:
  - b. Timberland Regional Library
  - c. Address provided in Project Information
2. Upon receipt of the written protest, the Owner shall consider the protest. The Owner may provide other affected Bidder(s) the opportunity to respond in writing to the protest within three (3) business days of the Owner's receipt of the protest. If the protest is not resolved by mutual agreement with the protesting Bidder and the Owner, the Executive Director of the Owner will review the issues and furnish a final and binding written decision to the protesting Bidder and any other affected Bidder(s) within six (6) business days of the Owner's receipt of the protest. If more than one protest is filed, the Owner's decision will be provided within six (6) business days of the Owner's receipt of the last protest.
  3. Failure to comply with these protest procedures will render a protest waived.
  4. Timely and proper compliance with and exhaustion of these protest procedures shall be a condition precedent to any permissible judicial consideration of a protest.

#### **1.06 POST BID INFORMATION**

##### **A. Information From Apparent Low Bidder:**

1. Within two (2) business days of the Owner's or Architect's request, the apparent low Bidder and any other Bidders so requested shall submit the following to the Architect and the Owner. Failure to provide any of the above information in a timely manner may constitute an event of breach permitting forfeiture of the Bid security.
  - a. additional information regarding the use of their own forces and the use of Subcontractors and suppliers;
  - b. a properly executed AIA Document A305-1986 - Contractor's Qualification Statement or other form acceptable to the Owner and Architect; (unless otherwise required to be submitted at the time of the Bid);
  - c. a letter or form from the Bidder's insurance company stating that the insurance required by the Contract Documents will become effective upon execution of the Contract;
  - d. a letter or form from the Bidder's surety stating that the bond(s) required by the Contract Documents will become effective upon execution of the Contract;
  - e. a detailed breakdown of the Bid in a form acceptable to the Owner;
  - f. the names of the persons or entities (including a designation of the Work to be performed with the Contractor's own forces, and the names of those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work;
  - g. the proprietary names and the suppliers of the principal items or systems of materials and equipment proposed for the Work;
  - h. a signed statement in accordance with RCW 9A.72.085 verifying under penalty of perjury that the Bidder is in compliance with the responsible Bidder criteria of RCW 39.04.350(1)(g).
2. Responsible or Reliable Requirements: The Bidder will be required to establish to the satisfaction of the Architect and the Owner the reliability and Responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents as well as qualifications set forth in the Sections of the Project Manual pertaining to such proposed Subcontractor's respective trades. The Responsibility of the Bidder may be judged in part by the Responsibility of these proposed entities. The following will be considered:
  - a. The ability, capacity, and skill to perform the Contract;
  - b. The character, integrity, reputation, judgment, experience, and efficiency of the Bidder;
  - c. Whether the Bidder can perform the Contract within the time specified;
  - d. The quality of performance of previous Contracts;

- e. The previous and existing compliance by the Bidder with laws relating to the Contract;
  - f. The quality of performance of previous Contracts, including demonstrated successful completion of similar projects in the last three years;
  - g. The designated Project Manager shall have a minimum of three years of successful experience in project management and scheduling of projects of similar scope and complexity;
  - h. The designated Superintendent shall have a minimum of five years of successful supervision of projects of similar scope and complexity;
  - i. Any other qualifications required by the Contract Documents or Bidding Documents, and;
  - j. Such other information as may be secured having a bearing on the decision to award the Contract.
3. In considering a Bidder's Responsibility, a Bidder shall be deemed to be unqualified to perform the Contract if, after review and verification of the representations included upon the Contractor's Qualification Statement submitted by the Bidder, conditions such as, but not limited to, the following appear:
- a. The Bidder does not have sufficient prior experience (or an acceptable substitute thereof, as described below) with projects of a similar nature in technical, managerial, and financial requirements to that in the present Contract being Bid. In addition to such established Contractors, a newly established Contractor may be considered qualified if it has shown on the Contractor's Qualification Statement that it is staffed with sufficient technical, managerial, and financial personnel with prior experience in the nature of construction for which the Bids are invited.
  - b. The Bidder does not have sufficient capability to undertake the obligations of the Contract. A determination will be made when the Owner's review of the probable cash flow needs of the Bidder for this Project (including payroll, cost of material and supplies, equipment rental costs, and any other direct or incidental costs of the Contract), concludes that the Bidder does not have sufficient financial resources to enable it to satisfy its financial obligations under the Contract.
  - c. The Bidder has submitted unrealistic unit prices as determined by other Bidders' unit prices for this Project.
  - d. The Bidder does not have sufficient staff, equipment, or plant available to perform the Contract. The Owner's determination in this matter will be based upon that represented by Bidder in the Contractor's Qualification Statement.
  - e. The Bidder has a history of unsatisfactory performance of Contracts of this or similar nature, regardless of whether such Contracts existed between the Owner and the Bidder, or other parties.
  - f. A determination of this nature will be made if the Owner, after review of the Bidder previous Work experience, determines that the Bidder's unsatisfactory performance has resulted predominantly from the Bidder's failure rather than a failure to perform by another party. The Owner will give the Contractor an opportunity to explain such nonperformance's before any final determination is reached.
  - g. A determination of failure to perform will be made if the School District is satisfied after review of the Bidder's prior experience, that the Bidder has failed to satisfy its obligations under past Contracts and the Owner cannot safely assume satisfactory performance of the Contract by the Bidder.
  - h. In reaching its determination, the Owner may consider statements of other parties to the prior unperformed Contracts, as well as the representations of the Bidder on its Contractor's Qualification Statement.
  - i. The Responsibility of the Bidder may be judged in part by the Responsibility of its Subcontractors. Bidders must verify Responsibility criteria for each first-tier Subcontractor. A Subcontractor of any tier that hires other Subcontractors must verify Responsibility criteria for each of its next lower-tier Subcontractors. Verification shall include that each Subcontractor, at the time of subcontract execution, is Responsible



- and possesses an electrical Contractor license, if required by RCW 19.28, or an elevator Contractor license, if required by RCW 70.87, and can obtain any payment and performance bonds required by the Bidding or Contract Documents.
- j. No later than ten (10) days prior to the Bid Date, a potential Bidder may request in writing that the Owner modify the Responsibility criteria listed above in this clause or elsewhere in the Contract Documents or the Bidding Documents. The Owner will evaluate the information submitted by the potential Bidder and respond before the Bid Date. If the evaluation results in a change of the criteria, the Owner will issue an Addendum identifying the new criteria.
4. Prior to the Award of the Contract, the Architect will notify the Bidder in writing if either the Owner or the Architect, after due investigation, has reasonable objection to the Bidder or a person or entity proposed by the Bidder, and the Owner will provide the reasons for the determination. The Bidder may appeal the determination within two (2) business days of its receipt of the objection by presenting additional information to the Owner, and the Owner shall consider the additional information before issuing its final determination. The Bidder may, after the Owner's objection or determination, and at Bidder's option,
- a. Withdraw the Bid, (2) submit an acceptable substitute person or entity with no change in the Contract Time and no adjustment in the Base Bid or any Alternate Bid, even if there is a cost to the Bidder occasioned by the substitution, or (3) appeal by filing a protest in accordance with paragraph 5(D). In the event of withdrawal, Bid security will not be forfeited.
5. Persons and entities proposed by the Bidder and to whom the School District or the 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 the Architect.
6. The Bidder's representations concerning its qualifications will be construed as a covenant under the Contract. Should it appear that the Bidder has made a material misrepresentation on its Contractor's Qualification Statement, the Owner shall have the right to terminate the Contract for cause for the Contractor's breach, and the Owner may then pursue such remedies as exist elsewhere under this Contract, or as otherwise are provided at law or equity.
- B. Bidding Mistakes:
1. The Owner shall not be obligated to consider notice of claimed Bidding mistakes received more than two (2) business days after the Bid opening. In accordance with Washington law, a low Bidder that claims error and fails to enter into the Contract is prohibited from Bidding on the Project if a subsequent call for Bids is made for the Project.

#### **1.07 PERFORMANCE BOND AND LABOR AND MATERIAL BOND**

- A. Bond Requirements:
1. After issuance of the Conditional Notice to Proceed, and with the signed Contract, the Bidder shall furnish evidence satisfactory to the Owner of its ability to obtain statutory bonds pursuant to RCW 39.08 covering the faithful performance of the Contract and the payment of all obligations arising thereunder in the form and amount prescribed in the Contract Documents. The cost of such bond shall be included in the Base Bid.
2. Contract bond shall be executed on a State of Washington Public Works Contract Bond and with Surety Company licensed to do business in the State of Washington. Contract bond shall be in amount equal to 100% of the Contract sum, base Bid as indicated by Bidder on the proposal form, Bidding alternates as selected by Owner and applicable State of Washington and local taxes.
- a. The provisions of said bond shall:
- 1) Guarantee faithful performance of Work covered by the Contract Documents.
- 2) Require prompt payment of all contributions or amounts due the State Accident Fund and the Unemployment Compensation Fund; prompt payment to the State Tax Commission of all income tax amounts withheld from employees pursuant to the laws of the State of Washington; prompt payments to all persons

- supplying labor or material for any prosecution of the Work provided for the Contract.
- 3) Permit no lien or claim to be filed or prosecution against the Owner on account of any labor or material furnished.
  - 4) Remain in full force and effect until the above required provisions have been satisfied and final completion has been authorized by the school district.
3. The Owner reserves the right to require certain Subcontractors to furnish performance and labor and material payment bonds in form as set forth herein and as set forth under the Bidding Documents or Contract Documents. The Owner shall not, however, be responsible for any costs for any Subcontractor bonds unless the Owner, prior to the execution of the Owner-Contractor Agreement, requires the Bidder, in writing, to furnish such bonds from designated Subcontractors. Should any bonds be furnished by subcontract Bidders, or be required by any Bidder or be furnished by any subcontract Bidder or Subcontractor, without the written request of the Owner prior to the execution of the Owner-Contractor Agreement, the costs for any such bonds shall be at the expense of the Bidder and shall not be added to the Contract Sum.
- B. Time of Delivery and Form of Bonds:
1. The Bidder shall deliver the required bonds to the Owner with the signed Contract and prior to commencing operations at the site. The bonds shall be written in the form approved by the Owner for public Work, as required by RCW 39.08. The bonds shall be written by a surety firm licensed to do business in the State of Washington, with an A.M. Best rating of at least A/IX. The Bidder shall require the Attorney-in-Fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy.

#### **1.08 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR**

- A. Form to Be Used:
1. The Agreement for the Work will be written on the Agreement between Owner and Contractor, where the basis of payment is a Stipulated Sum. The Agreement for the Work shall include the General Conditions, Special Conditions, and the other Contract Documents included with the Project Manual. In the event no form is enclosed, an AIA Document A101-2017, "Standard Form of Agreement Between Owner and Contractor, where the basis of payment is a Stipulated Sum," along with the General Conditions (AIA Document A201- 2007), as both are revised, modified and supplemented by the Owner, will be used. All references in these Instructions to Bidders to the A101 or the A201 refer to the documents as revised by the Owner.
- B. Conflicts:
1. In case of conflict between the provisions of these Instructions and any other Bidding Document, these Instructions shall govern. In case of conflict between the provisions of the Bidding Documents and the Contract Documents, the Contract Documents shall govern.

#### **1.09 SUPPLEMENTARY INSTRUCTIONS**

- A. Liquidated Damages:
1. The Contract Documents specify liquidated damages for the Owner and the Contractor.
- B. Retainage:
1. The Contract Documents specify the statutory retainage requirements of RCW 60.28 for this Project.
- C. Contract Time:
1. The Contract Documents specify the Contract Time. **TIMELY COMPLETION OF THIS PROJECT IS ESSENTIAL TO THE OWNER.**
  2. The amount of time necessary to substantially complete the Work is stipulated in the **BID/PROPOSAL FORM**. For each calendar day in excess of the established substantial completion period that the Work remains incomplete, the Contractor shall pay the Owner liquidated damages as described under Liquidated Damages in Section 01 30 00,

Administrative Requirements.

- D. Prevailing Wages:
  - 1. The Contract Documents contain requirements regarding the payment of prevailing wages pursuant to RCW 39.12.
- E. Written Notice:
  - 1. The Contract Documents contain a number of provisions that require the Contractor to make Claims in writing within a specified time in order to maintain the claim.
- F. Estimate for Payment Form:
  - 1. Such form, shall be AIA Document G702 and G703 application for payment on Contract, executed in triplicate by the Contractor for each progress payment, as application and certificate for payment based on Payments and Completion Article requirements under General Conditions.
  - 2. Payment of that portion of the Contract amount allocated to Contract close-out in the schedule of values shall not be made until all Work is completed and approved by the Owner. The percentage of the Contract amount allocated to Contract close-out on this project shall be three percent (3%) and shall be represented on the schedule of values as a single line item.
- G. Changes in Contract Sum:
  - 1. The Contract Documents contain provisions specifying requirements for and pricing of changes in the Contract Sum.
- H. Dispute Resolution:
  - 1. The Contract Documents contain provisions replacing the arbitration provisions of the form General Conditions with an alternative dispute resolution procedure which, among other things, requires non-binding mediation of all disputes.
- I. Contractor Registration:
  - 1. Pursuant to RCW 39.06, the Bidder shall be registered or licensed as required by the laws of the State of Washington, including but not limited to RCW 18.27.
- J. Other Provisions:
  - 1. The above paragraphs contain descriptions of some but not all of the provisions of the Contract Documents, Bidders should review in detail the Contract Documents themselves and not rely upon the above paragraphs in this Article as complete, inclusive, or accurate.

**1.10 POSSIBLE TRENCH EXCAVATION SAFETY PROVISIONS**

- A. To ensure that the Bidder agrees to comply with relevant trenching safety requirements of RCW39.04.180 and RCW 49.17, the Base Bid must include the cost of any required trench safety provisions. The Bidder shall enter in the blank provided on the Bid form the dollar amount the Bidder has included in its Base Bid for any trench safety provisions for trenching that will exceed a depth of four feet. If trench excavation safety provisions do not pertain to the Project, the Bidder may enter "N.A." or "Not Applicable" in the blank on the Bid form.

**END OF SECTION**

**SECTION 00 41 00  
BID FORM**

**BID:**

**PROJECT**

Project Name: **Timberland Regional Library - Mountain View Library**  
10111 US Highway 12  
Randle, Washington 98377

**SUBMIT BASE BID AND ANY ALTERNATES**

By: 2 p.m. (PDT), January 17, 2024  
Timberland Regional Library  
415 Tumwater Boulevard SW  
Tumwater, Washington 98501

**SUBMIT SUB LIST**

By: 3 p.m. (PDT), January 17, 2024

**BID OPENING - BASE BIDS, ALTERNATES & SUB LIST**

At: 3 p.m. (PDT), January 17, 2024  
Timberland Regional Library  
415 Tumwater Boulevard SW  
Tumwater Washington, 98501

**SUBMIT LIST OF STRUCTURAL STEEL & REBAR INSTALLERS**

By: 2 p.m. (PDT), January 19, 2024  
Timberland Regional Library  
415 Tumwater Boulevard SW  
Tumwater Washington, 98501

**FROM:** \_\_\_\_\_

**(GENERAL CONTRACTOR NAME)**

**TO: TIMBERLAND REGIONAL LIBRARY**

The undersigned proposes to furnish materials and labor and to perform all Work for the above-described project in strict accordance with the drawings, specifications and addenda numbered \_\_\_\_\_ to \_\_\_\_\_ inclusive for the base Bid of:

**DESCRIPTION**

BASE BID

Total Bid: \_\_\_\_\_ dollars  
and \_\_\_\_\_ cents (\$ \_\_\_\_\_)

**(Does Not Include Sales Tax)**

**TRENCH EXCAVATION SAFETY PROVISIONS**

If the Bid amount contains any Work which requires trenching exceeding a depth of 4-feet, all costs for trench safety shall be included in the Base Bid and indicated above for adequate trench safety systems in compliance with Chapter 39.04 RCW, 49.17 RCW and WAC 296-155-650. Bidder must include a lump sum dollar amount in blank below (even if the value is \$0.00) to be responsive.

Total Amount: \_\_\_\_\_ dollars  
and \_\_\_\_\_ cents (\$ \_\_\_\_\_)

**(Does Not Include Sales Tax)**

**IDENTIFICATION OF SELECTED SUBCONTRACTORS:** The Bidder shall name the Subcontractor with whom the Bidder, if awarded the Contract, will subcontract directly (not Subsubcontractors) for performance of the following Work (Submit as defined):

- Plumbing as described in RCW 18.106.
- Heating, ventilation and air conditioning.
- Electrical as described in RCW 19.28.
- Any other categories of Work listed below.

If the Bidder intends to self-perform any of the categories of Work, it must name itself for each such category of Work. The Bidder shall not list more than one entity for a particular category of Work identified, unless a Subcontractor varies with an Alternate Bid, in which case the Bidder shall identify the Subcontractor to be used for the Alternate in the specified column for the affected portion of the Work. If no entry is made in the "Subcontractor (if Alternate is Accepted)" column, it will be presumed that the Subcontractor will not change with any Alternates.

**IF A SUBCONTRACTOR CATEGORY WILL NOT BE USED ON THIS PROJECT, EITHER WRITE "NONE" OR LEAVE BLANK**

In accordance with RCW 39.30.060, failure of a Bidder to submit as part of the Bid the names of such proposed heating, ventilation and air conditioning, plumbing, or electrical Subcontractors or to name itself to perform such Work or the naming of two or more Subcontractors to perform the same Work shall render the Bidder's Bid nonresponsive and, therefore, void.

Sample table below. Prepare project appropriate table with adequate number of columns to address number of Alternates.

Type of Work	Plumbing per RCW 18.106	Heating, Ventilating & Air Conditioning	Electrical per RCW 19.28	Structural Steel Installer	Reinforcing Steel Installer
Subcontractor					
Subcontractor					
Subcontractor					

The undersigned agrees to hold this proposal open for forty-five (45) days following the opening of Bids and to execute the Agreement within seven (7) days if the Contract is awarded on the basis thereof.

The undersigned agrees, if awarded the Contract to substantially complete the Work per the schedule noted in the Administrative Requirements Section.

The undersigned further agrees that if awarded the Contract, not less than 10 percent of the Work (excluding General Conditions) shall be accomplished with the Bidder's own Work force.

The undersigned further agrees, if awarded the Contract, to execute and deliver to the owner not later than the date of execution of the Contract satisfactory performance and payment bonds in an amount equal to 100 percent of the total Contract sum (Base Bid plus accepted alternates, plus Washington State sales tax), and Certificate of Insurance.

Bid security in the form of a Bid bond, certified bank check, or cashier's check, in the amount not less than 5 percent of the base Bid, excluding applicable Washington State taxes, and all made payable to the owner, is enclosed. The undersigned agrees that such Bid security, accompanying this proposal and left in escrow with the owner, shall be forfeited and the amount stated herein made payable to the owner if the undersigned fails to execute and deliver the specified Agreement form and performance and payment bonds within ten (10) calendar days after being notified in writing by the owner of their selection as successful Bidder. The Bid security will be returned to the undersigned if this proposal is not accepted within forty-five (45) calendar days from above-indicated Bid opening date. If a Contract is awarded to any other Bidder, such Bid security will be returned to the undersigned within three (3) calendar days after Contract has been signed.

The requirements of Washington State RCW Chapter 39.12 Prevailing Wages are included as a part of this Bid and the undersigned agrees to comply with provisions thereof.

The owner reserves the right to reject any or all Bids and waive all informalities.

The undersigned hereby verifies under penalty of perjury, in accordance with RCW 9A.72.085, that Bidder is in compliance with the responsible Bidder criteria requirement of subsection (1)(g) of RCW 39.04.350. Specifically, within the three-year period immediately preceding the date of the Bid solicitation for this Project, Bidder has not been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction that Bidder has willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 49.52 RCW. The undersigned certifies (or declares) under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

**NAME OF FIRM:** \_\_\_\_\_

By:

\_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)

\_\_\_\_\_ (Name (Print/Type))

Date: \_\_\_\_\_

(Physical Location (City) of person signing this form at time of signing)

**ADDRESS:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Address Line 1)  
(Address Line 2)  
(City, State, Zip Code)  
(Telephone)  
(Fax Number)  
(Email)

**MEMBERS OF FIRM IF PARTNERSHIP OR JOINT VENTURE:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name (print/type)  
Signature  
Name (print/type)  
Signature  
Name (print/type)  
Signature

If firm is a corporation, state in which incorporated: \_\_\_\_\_  
State of Washington Contractor's registration number: \_\_\_\_\_  
State of Washington Contractor's license number: \_\_\_\_\_  
Federal Tax Identification Number (TIN): \_\_\_\_\_

**END OF SECTION**

**SECTION 00 45 19  
STATEMENT OF NONCOLLUSION**

**SUBMIT WITH BID FORM**

**NONCOLLUSION**

The Bid submitted must be genuine and not a sham or collusive Bid, or made in the interest or on behalf of any person not therein named; and further says that the said Bidder has not directly nor indirectly induced or solicited any Bidder of the Work, supplies, or equipment to put in a sham Bid, or any other person or corporation to refrain from Bidding, and that said Bidder has not in any manner sought by collusion to secure an advantage over any other Bidder or Bidders.

BIDDER: \_\_\_\_\_ (Contractor/Vendor Name - Please Type)

OFFICIAL SIGNATURE: \_\_\_\_\_

NAME - PLEASE TYPE: \_\_\_\_\_

TITLE - PLEASE TYPE: \_\_\_\_\_

DATE: \_\_\_\_\_

**END OF SECTION**



**SECTION 00 45 33.01  
STATEMENT OF NONSEGREGATED FACILITIES**

**SUBMIT WITH BID FORM**

**NONSEGREGATED FACILITIES**

(Applicable to construction Contracts and related Subcontracts and materials supply agreements exceeding \$10,000.)

The construction Contractor certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The construction Contractor certifies further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. As used in this certification, the term "segregated facilities" means any waiting rooms, Work areas, restrooms, and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or area in face segregated on the basis of race, creed, color or national origin because of habit, local custom or otherwise. The construction Contractor agrees that (except where they have obtained identical certifications from proposed Subcontractors and materials suppliers for specific time periods) they will obtain identical certifications from proposed Subcontractors and materials suppliers prior to the award of Subcontracts and materials supply agreements exceeding \$10,000 and that they will retain such certifications in their files.

CONTRACTOR - PLEASE TYPE: \_\_\_\_\_

OFFICIAL SIGNATURE: \_\_\_\_\_

NAME - PLEASE TYPE: \_\_\_\_\_

TITLE - PLEASE TYPE: \_\_\_\_\_

DATE: \_\_\_\_\_

**END OF SECTION**

**SECTION 00 52 00  
AGREEMENT FORM**

**PART 1 GENERAL**

**1.01 FORM OF AGREEMENT**

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

- A. The form of the FORM OF AGREEMENT, to be executed in triplicate by the Owner and the successful Bidder, shall be the Agreement Between the Owner and Contractor (where the basis of payment is a stipulated sum). Such Form is incorporated into these Bidding and Contract Documents.

**END OF SECTION**



# 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 2023.  
(In words, indicate day, month and year.)

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

Timberland Regional Library  
415 Tumwater Blvd. SW  
Tumwater, WA 98501-5799  
Telephone: (503) 359-4853

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

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

Timberland Regional Library - Mountain View Library  
10111 US Highway 12  
Randle, Washington 98377

Project consists of new library building and site work on a 5 acre site. Scope includes demolition of an existing single story motel building. Site work includes utilities, infrastructure, parking and circulation areas to accommodate the new library. Building construction is single story wood frame of approximately 3,300 sf.

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

Johansson Wing Architects, PC  
821 SE 14th Loop, Suite 109  
PO Box 798  
Battle Ground, WA 98604  
Telephone: (360) 687-8379

The Owner and Contractor agree as follows.

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.

## 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.

[ X ] By the following date: October 1, 2024

§ 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 ~~(\$—)~~, (\$ ) plus Washington State and local sales tax on the Contract Sum, 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
<u>As allowed under the bidding documents or Contract Documents.</u>		

§ 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 pursuant to Section 9.3 of the AIA Document A201-2017 as revised, and Certificates for Payment issued by ~~the Architect, the Architect~~ pursuant to Section 9.4 of the AIA Document A201-2017 as revised, 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, consistent with the AIA Document A201-2017 as revised 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, last working day of a month and the Contractor has satisfied those other conditions specified in Section 9.3 of the AIA Document A201-2017 as revised,~~ the Owner shall make payment of the amount certified to the Contractor ~~not later than the day of the month, as specified in Section 9.6 of the AIA Document A201-2017 as revised~~. 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 as otherwise provided by the Contract Documents, 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 Pursuant to Section 9.2 of the AIA Document A201-2017 as revised, each~~ Application for Payment shall be based on the most recent approved 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 Work and as specified in the Contract Documents.~~ The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect or Owner 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 Project site for subsequent incorporation in the completed construction, or, if approved in writing and 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 and the Owner agrees, is due and payable under Section 7.3 of the AIA Document A201-2017 as revised.~~

§ 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 Owner or 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 or Owner may withhold payment, or for which the Owner or Architect may 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.)*

Five percent (5%) of each approved Application for Payment shall be retained, unless the Contractor submits, and the Owner accepts, a retainage bond pursuant to RCW 60.28.011(6).

§ 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.)*

Not Used

§ 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.)*

Reduction or limitation of retainage, if any, shall be as provided in Washington statute and the Contract Documents.

§ 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.)*~~ The Contractor may make a request for payment of retainage following Final Completion, and the Owner will release retainage.

§ 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 written approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the Project 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.~~ by the Architect; and
- .3 Final Acceptance by the Owner’s Board of Directors has occurred.

§ 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:

Sixty (60) days after Final Acceptance, as defined in Section 9.10 of the AIA Document A201-2017 as revised.

## § 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.)*

~~%~~ As specified in Chapter 39.76 RCW.

Init.

## 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)*

Litigation in Superior Court for the County of Thurston, Washington.

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.)~~ Not Used

§ 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 designated representative:  
*(Name, address, email address, and other information)*

§ 8.3 The Contractor's designated representative:  
*(Name, address, email address, and other information)*

Init.



§ 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, A201-2017 as revised, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™-2017 Exhibit A, A201-2017 as revised, 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.)*

As stated in Section 1.6 of the AIA Document A201-2017 as revised and elsewhere in the Contract Documents.

#### § 8.7 Other provisions:

**§ 8.7.1 Public Records Act Compliance.** Contractor understands that the Owner is bound by the Washington Public Records Act, Chapter 42.56 RCW. Contractor agrees to fully cooperate with the Owner in responding to public records requests. The Contractor shall promptly provide such records to the Owner as requested by the Owner or required by law for the Owner to fulfill its obligations in responding to public records requests. Such records shall be provided at no cost to the Owner. Contractor shall cause any subcontract to contain this provision. This section shall survive expiration or termination of this Agreement for any reason.

**§ 8.7.2 Substitution of Personnel.** Contractor and the Owner have no present intention to substitute personnel, and the parties shall endeavor to minimize substitutions and maintain continuity of personnel, but each reserves the right to substitute its personnel for the purpose of carrying out its responsibilities under this Contract. Such substitution by the Contractor shall be subject to the approval of the Owner, which approval shall not be unreasonably withheld. If the Contractor substitutes personnel, it shall not charge the Owner for any extra costs incurred thereby, including, without limitation, costs incurred to familiarize new personnel with the Project. If requested by the Owner, the Contractor shall remove from performing the Work, without cost to the Owner or delay to the Work, any person whose removal the Owner reasonably requests. Nothing in this provision shall be construed to alter the independent contractor status of the Contractor.

**§ 8.7.3 Prohibited Interest.** Contractor shall ensure that its officers, employees, and agents, and those of its Subcontractors, comply with the Code of Ethics for Municipal Officers, Chapter 42.23 RCW, which, among other things, prohibits municipal officers from being beneficially interested, directly or indirectly, in any contract which may be made by, through, or under the supervision of such officer, in whole or in part. Contractor shall remove, at its sole cost and expense, any of its or its Subcontractors' employees or agents if they are in violation of this provision. No director, officer, or employee of the Owner shall have any interest, directly or indirectly, in this Contract or the proceeds thereof prohibited by Chapter 42.23 RCW.

**§ 8.7.4 Severability.** If, for any reason, any part, term or provision of this Agreement is held by a court of competent jurisdiction to be illegal, void, or unenforceable, the validity of the remaining provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Agreement did not contain the particular provision held to be invalid; provided, however, that if it should appear that any provision of the Contract Documents

Init.

is in conflict with any statutory provision of the State of Washington, the provision shall be deemed modified to conform to such statutory provision.

**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 (as revised by Owner). All references to the A101 or to the Agreement are to the document as revised by the Owner.
- .2 ~~AIA Document A101™–2017, Exhibit A, Insurance and Bonds Not Used~~
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction (as revised by Owner). All references to the A201 or to the General Conditions are to the document as revised by the Owner.
- .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.)~~Not Used.

.5 Drawings

Number	Title	Date
<u>See the Index of Drawings in the Project Manual.</u>		

.6 Specifications

Section	Title	Date	Pages
<u>See the Table of Contents in the Project Manual.</u>			

.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
----------	-------	------	-------

Init.

/

- 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)*

## **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 this certification at 19:24:55 PT on 10/25/2023 under Order No. 2114408932 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ – 2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, other than changes shown in the attached final document by underscoring added text and striking over deleted text.

\_\_\_\_\_  
*(Signed)*

\_\_\_\_\_  
*(Title)*

\_\_\_\_\_  
*(Dated)*

**SECTION 06 10 00  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural dimension lumber framing.
- B. Exposed timber structural framing.
- C. Nonstructural dimension lumber framing.
- D. Rough opening framing for doors, windows, and roof openings.
- E. Sheathing.
- F. Roof-mounted curbs.
- G. Roofing nailers.
- H. Preservative treated wood materials.
- I. Fire retardant treated wood materials.
- J. Miscellaneous framing and sheathing.
- K. Communications and electrical room mounting boards.
- L. Concealed wood blocking, nailers, and supports.
- M. Miscellaneous wood nailers, furring, and grounds.
- N. Roof sheathing with factory applied roofing underlayment.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 15 00 - Wood Decking.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2023.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023a.
- E. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings 2018, with Errata (2019).
- F. AWPA U1 - Use Category System: User Specification for Treated Wood 2023.
- G. PS 1 - Structural Plywood 2019.
- H. PS 2 - Performance Standard for Wood Structural Panels 2018.
- I. PS 20 - American Softwood Lumber Standard 2021.
- J. WWPA G-5 - Western Lumber Grading Rules 2021.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, 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.

### **1.05 QUALITY ASSURANCE**

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP);  
[www.airbarrier.org/#sle](http://www.airbarrier.org/#sle):

### **1.06 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: Douglas Fir-Larch, 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](http://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. Grading Agency: Western Wood Products Association; WWPA G-5.
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Stud Framing (2 by 2 through 2 by 6 ):
1. Species: as indicated.
  2. Grade: as indicated.
- D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 ):
1. Species and Grades: As indicated on drawings for various locations.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
  2. Boards: Standard or No. 3.

### **2.03 EXPOSED DIMENSION LUMBER**

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Grading Agency: Western Wood Products Association; WWPA G-5.
- C. Sizes: Nominal sizes as indicated on drawings.
- D. Surfacing: S4S.
- E. Moisture Content: S-dry or MC19.
- F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 ):
1. Species and Grades: As indicated on drawings for various locations.

### **2.04 TIMBERS FOR CONCEALED APPLICATIONS**

- A. Grading Agency: Western Wood Products Association; WWPA G-5.

- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry (23 percent maximum).
- D. Beams and Posts 5 inches and over in thickness:
  - 1. Species: as indicated.
  - 2. Grade: as indicated.

#### **2.05 EXPOSED TIMBERS**

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (20 percent maximum).
- C. Surfacing: S4S.
- D. Species: as indicated.
- E. Grade: as indicated
- F. Grade: Clear Heart Structural.

#### **2.06 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: as indicated.
- E. Grade: As indicated

#### **2.07 CONSTRUCTION PANELS**

- A. Roof Sheathing: PS 2 type, rated Structural I Sheathing.
  - 1. Bond Classification: Exterior.
  - 2. Span Rating: 60.
  - 3. Performance Category: 5/8 PERF CAT.
- B. Roof Sheathing: Oriented strand board wood structural panel; PS 2.
  - 1. Grade: Structural 1 Sheathing.
  - 2. Bond Classification: Exposure 1.
  - 3. Performance Category: 5/8 PERF CAT.
  - 4. Span Rating: 40/20.
  - 5. Edges: Square.
  - 6. Exposure Time: Sheathing will not delaminate or require sanding due to moisture absorption from exposure to weather for up to 500 days.
- C. Roof Sheathing: Wood construction panel laminated to insulation board.
  - 1. Construction Panel: 7/16 inch (11 mm) oriented strand board (OSB).
  - 2. Insulation Board: Polyisocyanurate foam plastic with cellulosic felt facer or glass fiber mat facer on major surface opposite construction panel.
  - 3. Finished Panel: Comply with ASTM C1289, Type V.
  - 4. Manufacturers:
    - a. Hunter Panels: [www.hunterpanels.com/#sle](http://www.hunterpanels.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Wall Sheathing: PS 2 type.
  - 1. Bond Classification: Exposure 1.
  - 2. Grade: Structural I Sheathing.
  - 3. Span Rating: 24.
  - 4. Performance Category: 5/16 PERF CAT.

5. Edge Profile: Square edge.
- E. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## 2.08 ACCESSORIES

- A. Fasteners and Anchors:
  1. As indicated by structural documents.
  2. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
  1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
- C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- D. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
  1. Manufacturers:
    - a. As indicated by structural documents
    - b. Where not indicated elsewhere: Franklin International, Inc; Titebond Fast Set Polyurethane Construction Adhesive: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. General Purpose Construction Adhesives:
  1. Manufacturers:
    - a. ADFAST Corporation; ADBOND EX 5690: [www.adfastcorp.com/#sle](http://www.adfastcorp.com/#sle).

## 2.09 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
  2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
  1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber exposed to weather.
    - c. Treat lumber in contact with roofing, flashing, or waterproofing.
    - d. Treat lumber in contact with masonry or concrete.
    - e. Treat lumber in other locations as indicated.
  2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
    - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
    - b. Treat plywood in contact with masonry or concrete.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- B. Coordinate installation of rough carpentry members specified in other sections.



### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 FRAMING INSTALLATION**

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by .
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

### **3.04 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In 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.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Provide the following specific nonstructural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Wall paneling and trim.
  - 9. Joints of rigid wall coverings that occur between studs.
  - 10. other as indicated.

### **3.05 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

### **3.06 INSTALLATION OF CONSTRUCTION PANELS**

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
  - 1. Nail panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.
  - 4. Size and Location: As indicated on drawings.

### **3.07 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

### **3.08 TOLERANCES**

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

### **3.09 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

### **3.10 CLEANING**

- A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
  - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- 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.

**END OF SECTION**

**SECTION 06 15 00  
WOOD DECKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Softwood lumber structural wood decking.

**1.02 REFERENCE STANDARDS**

- A. AITC 111 - Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection 2005.
- B. SPIB (GR) - Standard Grading Rules 2021.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.
- C. Shop Drawings: Indicate deck framing system, loads and cambers, bearing details, and framed openings.
- D. Samples of Wood Deck Exposed To View: Submit two samples, 6" by 6" inch in size illustrating wood grain, stain, and finish.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least three years of documented experience and certified by AITC.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect glue laminated members in accordance with AITC 111 requirements for unwrapped material.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

**2.02 WOOD MATERIALS**

- A. Wood fabricated from old growth timber is not permitted.
- B. Lumber Decking: Fabricated to AITC 112.
  - 1. Species: as indicated, graded under SPIB (GR) rules as AITC Select quality.
  - 2. Size: as indicated, nominal.

**2.03 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Fastener Type and Finish: Hot-dipped galvanized steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that support framing is ready to receive decking.

**3.02 PREPARATION**

- A. Coordinate placement of bearing items.

**3.03 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

**3.04 INSTALLATION - BOARD DECKING**

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.
- B. Fit butt end deck joints occurring between support members with metal splines to maintain tight, aligned joints.
- C. Engage decking tongue and groove edges.
- D. Secure with fasteners. Side spike planks together, through pre-drilled holes.

**END OF SECTION**

**SECTION 07 31 13  
ASPHALT SHINGLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Metal flashing.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Edge and cap flashings.
- B. Section 07 72 00 - Roof Accessories: Snow guards.

**1.03 REFERENCE STANDARDS**

- A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017 (Reapproved 2023).
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- C. ASTM D3161/D3161M - Standard Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method) 2020.
- D. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules 2023.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- F. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing 2016a (Reapproved 2021).
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- H. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.
- I. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021a.
- J. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments 2023.
- K. NRCA (RM) - The NRCA Roofing Manual 2023.
- L. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating material characteristics, performance criteria, limitations, and \_\_\_\_\_.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.
- E. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacture of roofing systems similar to those required for this project, with not less than 5 years of documented experience.

- B. Installer Qualifications: Company specializing in installing asphalt shingles, with at least 3 years of documented experience.

#### **1.06 MOCK-UPS**

- A. Provide mock-up of 100 sq ft, including underlayment, shingles, eave protection membrane, and associated flashings.
- B. Locate as directed by Architect.
- C. Mock-up may remain as part of work.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store materials with labels intact in manufacturer's unopened packaging until ready for installation.
- B. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.
- C. Protect materials from harmful environmental elements, construction dust, direct sunlight, and other potentially detrimental conditions.
- D. When storing roofing materials on roofing system ensure that no damage occurs to supporting members and other materials.

#### **1.08 FIELD CONDITIONS**

- A. Do not install shingles, eave protection membrane or underlayment when surface, ambient air, or wind chill temperatures are below 45 degrees F.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Asphalt Shingles:
  - 1. Certaineed Roofing; Landmark Premium Shingles: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 2. GAF; Timberline HDZ RS Shingles: [www.gaf.com/#sle](http://www.gaf.com/#sle).

#### **2.02 ASPHALT SHINGLES**

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
  - 1. Fire Resistance: Class A, complying with ASTM E108.
  - 2. Wind Resistance: Class A, when tested in accordance with ASTM D3161/D3161M.

#### **2.03 SHEET MATERIALS**

- A. Eave Protection Membrane:
  - 1. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
- B. Eave Edge Starter Shingles: Glass felt base, with ceramic coated mineral granules tightly embedded in refined, water-resistant asphalt, complying with ASTM D3462/D3462M.
  - 1. Shingle Size: 7-5/8 by 38-3/4 inches, nominal.
- C. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
  - 1. Minimum Requirements: Comply with ICC-ES AC188.
  - 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
  - 3. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
  - 4. Water Vapor Permeance: 0.067 perm, when tested in accordance with ASTM E96/E96M, Procedure A (desiccant method).
  - 5. Performance: Meet or exceed requirements for ASTM D226/D226M, Type II asphalt-saturated organic felt.

6. Liquid Water Transmission: Passes ASTM D4869/D4869M.
7. Functional Temperature Range: From minus 70 degrees F to 212 degrees F.
8. Products:
  - a. Certaineed Roofing; DryRoof SA - Self-Adhered: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - b. System Components Corporation, Inc; FeITex SA300: [www.systemcomponents.net/#sle](http://www.systemcomponents.net/#sle).
  - c. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.04 METAL FLASHING**

- A. Metal Flashing: Prefinished galvanized steel; see Section 07 62 00.
- B. Metal Flashings: Provide sheet metal eave edge, gable edge, ridge, ridge vents, open valley flashing, chimney flashing, dormer flashing, and other flashing as indicated.
  1. Form flashings to profiles indicated on drawings.
  2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
  3. Hem exposed edges of flashings minimum 1/4 inch on underside.

#### **2.05 ACCESSORIES**

- A. Roofing Nails: Standard round wire shingle type, galvanized steel, stainless steel, aluminum roofing nails, or copper roofing nails, minimum 3/8-inch head diameter, 12-gauge, 0.109-inch nail shank diameter, 1-1/2 inches long and complying with ASTM F1667/F1667M.
- B. Asphalt Roof Cement: ASTM D4586/D4586M, asbestos-free.
- C. Snow Guards: See Section 07 72 00.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions prior to starting this work.
- B. Verify that roof deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

#### **3.02 PREPARATION**

- A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.
- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

#### **3.03 INSTALLATION**

- A. Eave Protection Membrane:
  1. Install eave protection membrane from eave edge to minimum 48 inches up-slope beyond interior face of exterior wall.
  2. Install eave protection membrane in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Underlayment:
  1. Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches; stagger end laps of each consecutive layer and nail in place.
  2. Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches; stagger end laps of each consecutive

- layer, nail in place, and weather lap minimum 4 inches over eave protection.
3. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.
- C. Valley Protection:
1. Install valley protection in accordance with SMACNA (ASMM), Detail as required and recommended by manufacturer for metal flashed valleys..
  2. Install flexible flashing in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
  3. At Exposed Valleys: Install one layer of sheet metal flashing, minimum 24 inches wide, centered over open valley and crimped to guide water flow. Weather lap joints minimum 2-inch wide band of lap cement along each edge of first layer, press roll roofing into cement, and nail in place minimum 18 inches on center and 1 inch from edges.
- D. Metal Flashing:
1. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
  2. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
  3. Secure in place with nails as required and or recommended by manufacturer, and conceal fastenings.
  4. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.
- E. Shingles:
1. Install shingles in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
    - a. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
    - b. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
  2. Place shingles in straight coursing pattern with 5-inch weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
  3. Project first course of shingles 3/4 inch beyond fascia boards.
  4. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
  5. Coordinate installation of roof mounted components or work projecting through roof with weathertight placement of counterflashings.
  6. Complete installation to provide weathertight service.

### **3.04 CLEANING**

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean exposed work upon 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 traffic over finished roof surface; protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged asphalt shingles or accessories before Date of Substantial Completion.

**END OF SECTION**



**SECTION 07 72 00  
ROOF ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Curbs.
- B. Roof penetrations mounting curbs.
- C. Roof hatch for interior attic equipment access.
- D. Snow guards.

**1.02 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.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
  - 1. Snow Guards: Submit design calculations for loadings and spacings based on manufacturer testing.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

**PART 2 PRODUCTS**

**2.01 ROOF CURBS**

- A. Manufacturers:
  - 1. AES Industries Inc: [www.aescurb.com/#sle](http://www.aescurb.com/#sle).
  - 2. The Pate Company: [www.patecurbs.com/#sle](http://www.patecurbs.com/#sle).
  - 3. MKT Metal Manufacturing: [www.mktduct.com/#sle](http://www.mktduct.com/#sle).
  - 4. Roof Products & Systems (RPS): [www.rpscurbs.com/#sle](http://www.rpscurbs.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - 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. Galvanized Steel: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33; G60 coating designation; 18 gauge, 0.048 inch thick.
  - 3. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing system at 1:1 slope; minimum cant height 4 inches.
  - 4. 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 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 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.
5. Provide layouts and configurations indicated on drawings.
- C. Curbs Adjacent to Roof Openings: Provide curb on each side of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
  2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
  3. Height Above Roof Deck: 14 inches, minimum.
- D. Pipe, Duct, or Conduit Mounting Curbs: Vertical posts, minimum 8 inches square unless otherwise indicated.

## **2.02 ROOF HATCHES AND VENTS, MANUAL AND AUTOMATIC OPERATION**

- A. Roof Hatch Manufacturers:
- B. Roof Hatches and Smoke Vents: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
1. Style: Provide flat metal covers unless otherwise indicated.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
1. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
  2. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
  3. Curb Height: 12 inches from finished surface of roof, minimum.
- D. Metal Covers: Flush, insulated, hollow metal construction.
1. Capable of supporting 40 psf live load.
  2. Material: Mill finished aluminum; outer cover 11 gauge, 0.0907 inch thick, liner 0.04 inch thick.
  3. Insulation: Manufacturer's standard 1 inch rigid glass fiber.
  4. Gasket: Neoprene, continuous around cover perimeter.
- E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
  2. Hinges: Heavy duty pintle type.
  3. Hold open arm with vinyl-coated handle for manual release.
  4. Latch: Upon closing, engage latch automatically and reset manual release.
  5. Manual Release: Pull handle on interior.
  6. Locking: Padlock hasp on interior.

## **2.03 SNOW GUARDS**

- A. Unit Snow Guards: Individual projecting metal shapes, set between roofing shingles/tiles, and mechanically fastened to roof deck.
1. Projecting Metal Shapes: Zinc plated steel, triangular spike design.
  2. Placement: As indicated on drawings.
  3. Manufacturers:

- a. Alpine Snow Guards; PD10 Pad-Style Snow Guard:  
[www.alpinesnowguards.com/#sle](http://www.alpinesnowguards.com/#sle).
- b. Berger Building Products: [www.bergerbp.com/#sle](http://www.bergerbp.com/#sle).
- c. Rocky Mountain Snow Guards, Inc; ST9 Snow Guard:  
[www.rockymountainsnowguards.com/#sle](http://www.rockymountainsnowguards.com/#sle).
- d. TRA Snow and Sun: [www.trasnowandsun.com/#sle](http://www.trasnowandsun.com/#sle).
- e. Substitutions: See Section 01 60 00 - Product Requirements.

### **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.

**END OF SECTION**

**SECTION 00 72 00  
GENERAL CONDITIONS**

**FORM OF GENERAL CONDITIONS**

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

- A. Modified, AIA Document A201, General Conditions of the Contract for Construction

**END OF SECTION**



# AIA® Document A201® – 2017

## General Conditions of the Contract for Construction

**for the following PROJECT:**

*(Name and location or address)*

Timberland Regional Library - Mountain View Library  
10111 US Highway 12  
Randle, Washington 98377  
Johansson Wing Project No.: 22048

**THE OWNER:**

*(Name, legal status and address)*

Timberland Regional Library  
415 Tumwater Blvd. SW  
Tumwater, WA 98501-5799  
Telephone: (503) 359-4853

**THE ARCHITECT:**

*(Name, legal status and address)*

Johansson Wing Architects, PC  
821 SE 14<sup>th</sup> Loop, Suite 109  
PO Box 798  
Battle Ground, WA 98604  
Telephone: (360) 687-8379

**TABLE OF ARTICLES**

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS

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

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

Init.

User Notes:

(1400522320)

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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

Drawings and Specifications shall be provided as two-dimensional Construction Documents in a static format not intended to allow modification. To the extent Revit or other building information modeling software is used by Architect or its consultants, or Owner's other consultants, building information models may be provided to Contractor

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"as-is," and subject to Architect's standard electronic document release. Contractor acknowledges that, unless otherwise agreed in writing, any building information models provided to Contractor were not developed for Contractor's purposes or anticipated use. 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 by the Contractor shall be at the Contractor'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 party.

## **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 thoroughly reviewed and inspected the Drawings, Specifications, all Contract Documents and all other information and documents provided by Owner or Architect to Contractor, 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. The Contractor shall engage workers who are skilled in performing the Work, and all Work shall be performed with care and skill and in a workmanlike manner under the supervision by the Contractor. The Contractor shall be liable for all property damage, including repairs and replacement of the Work and economic losses, which proximately result from the breach of this duty. The Contractor shall advise the Architect (a) if a specified product deviates from good construction practices; (b) if following the Specifications will affect any warranties; or (c) any objections which the Contractor may have to the Specifications or Contract Documents.

§ 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.

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### **§ 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. Architect's review shall be limited to whether the schedule provides reasonable time, in the Architect's professional opinion, for the Architect to adequately review the Contractor's submittals. 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, ("Design-Build Components", sometimes referred to as "Delegated-Design"), 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.~~ review all performance and design criteria for Design-Build Components to confirm that such performance criteria is adequate and sufficient to provide properly functioning Design-Build Components. . 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. Overhead and profit, as allowed under this Article 7, shall be deemed to cover all costs and expenses of any nature whatsoever, including without limitation those for general condition items such as clean-up, protection, supervision, estimating, field operations, small tools, security and jobsite operating costs, which the Contractor or any of its Subcontractors may incur in the performance of or in connection with a Change in the Work.

§ 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.

### **§ 7.5 PRICING COMPONENTS**

**§ 7.5** The total cost of any Change in the Work or of any other increase or decrease in the Contract Sum, including a Claim, shall be limited to the following components:

**§ 7.5.1 Direct Labor Costs:** These are the labor costs determined by the number of additional craft hours and the hourly costs necessary to perform the change in the Work. The hourly cost shall be based upon the following:

- .1** Basic wages and fringe benefits: The hourly wage (without markup or labor burden) and fringe benefits paid as established by the Washington Department of Labor and Industries or contributed to labor trust funds as itemized fringe benefits, whichever is applicable, not to exceed that specified in the applicable "Intent to Pay Prevailing Wage" for the laborers, apprentices, journeymen, and foremen performing and/or directly supervising the Change in the Work on the site. The premium portion of overtime wages is not included unless preapproved in writing by the Owner. Costs paid or incurred for vacations, per diem, subsistence, housing, travel, bonuses, stock options, or discretionary payments to employees are not separately reimbursable. The Contractor shall provide copies of certified payrolls for itself and Subcontractors of any tier upon the Owner's request.
- .2** Workers' insurances: Direct contributions to the State of Washington as industrial insurance; medical aid; and supplemental pension by class and rates established by the Washington Department of Labor and Industries.
- .3** Federal insurances: Direct contributions required by the Federal Insurance Compensation Act (FICA); Federal Unemployment Tax Act (FUTA); and State Unemployment Compensation Act (SUCA).

Upon the Owner's request, the Contractor shall substantiate all claimed wage rates and shall provide a breakdown of the various components of the labor costs in a form provided or approved by the Owner.

**§ 7.5.2 Direct Material Costs:** This is an itemization, including material invoice, of the quantity and cost of additional materials reasonable and necessary to perform the change in the Work. The unit cost shall be based upon the net cost after all discounts or rebates, freight costs, express charges, or special delivery costs, when applicable. No lump sum costs will be allowed except when approved in advance by the Architect and the Owner. If the Contractor is offered discounts and/or rebates based upon prompt payment, the Contractor shall offer the Owner the opportunity to take advantage of such discount and/or rebate, and if the Owner makes such a prompt payment then the Owner shall only be charged the price as reduced by the discount and/or rebate. If the Owner declines the opportunity the Contractor may keep any such discounts and/or rebates it achieves through its own prompt payment. If the Contractor does not provide the Owner the opportunity to participate, the Contractor may only charge the net costs after consideration of discounts and rebates.

**§ 7.5.3 Construction Equipment Usage Costs:** This is an itemization of the actual length of time that construction equipment appropriate for the Work will be used solely on the change in the Work at the site, multiplied by the applicable rental cost as established by the lower of the local prevailing rate published in the "Rental Rate Blue Book" by EquipmentWatch, Atlanta, Georgia (copies of which shall be provided to the Owner), as modified by the AGC/WSDOT agreement or the actual, reasonable rate paid to unrelated third parties as evidenced by rental receipts. Rates and quantities of equipment rented that exceed the local fair market rental costs shall be subject to the Owner's prior approval. Total rental charges for equipment or tools shall not exceed seventy-five percent (75%) of the fair market purchase value of the equipment or the tool. Actual, reasonable mobilization costs are permitted if the equipment is brought to the Site solely for the change in the Work. If more than one rate is applicable, the best available rate shall be utilized. The rates in effect at the time of the performance of the changed Work are the maximum rates allowable for equipment of modern design and in good working condition and include full compensation for furnishing all fuel, oil, lubrication, repairs, maintenance, and insurance to the same extent as the comparable Blue Book or fair market rate. Equipment not of modern design and/or not in good working condition shall have lower rates. Hourly, weekly, and/or monthly rates, as appropriate, shall be applied to yield the lowest total cost. When rental rates payable do not include fuel, lubrication, maintenance, and servicing, as defined as operating costs in the Blue Book, such operating costs shall be reimbursed based on actual costs. The rate for equipment necessarily standing by for future use on the changed Work shall be no more than fifty percent (50%) of the rate

established above. If equipment is required for which a rental rate is not established by Blue Book, an agreed rental rate shall be established for that equipment, which rate and use must be approved by the Owner prior to performing the Work.

**§ 7.5.4 Cost of Change in Insurance or Bond Premium:** This is defined as:

- .1 Contractors' liability insurance: The actual cost (expressed as a percentage submitted with the certificate of insurance provided under Section 11.3.1.1, and subject to audit) of any changes in the Contractor's liability insurance arising directly from the changed Work; and
- .2 Public works bond: The actual cost (expressed as a percentage submitted with evidence of bondability under Section 11.6, and subject to audit) of the change in the Contractor's premium for the Contractor's statutorily required performance and payment bond arising directly from the changed Work, and any such premiums for the Changed Work on Subcontractor bonds that have been contractually required by the Owner. The Contractor is not entitled to any increased premium on any retainage bond or any Subcontractor bond not contractually required by the Owner, as such bonds are optional.

Upon request, the Contractor shall provide the Owner with supporting documentation from its insurer or surety of any associated cost incurred.

**§ 7.5.5 Subcontractor Costs:** These are payments the Contractor makes to Subcontractors for changed Work performed by such Subcontractors. The Subcontractors' cost of changed Work shall be determined in the same manner as prescribed in this Section 7.5.

**§ 7.5.6 Fee:** This is the allowance for all combined overhead, profit, and other costs, including all office, home office, and site overhead (including facilities, purchasing, clerical, project manager, project engineer, other engineers, project foreman, estimator, superintendent, and their vehicles and assistants), taxes (except for sales tax), employee per diem, subsistence and travel costs, warranty, safety costs, printing and copying, quality control/assurance, purchasing, small or hand tool (a tool that costs \$500 or less and is normally furnished by the performing contractor) or expendable charges, preparation of as-built drawings, impact on unchanged Work, Change Order and Claim preparation, and delay and impact costs of any kind (cumulative, ripple, or otherwise). No such costs may be added to the total cost to the Owner of any Change Order, Construction Change Directive, Claim or any other claim of any kind on this Project. No Fee shall be due, however, for direct settlements after Substantial Completion by the Owner of Subcontractor claims. The Fee shall be limited in all cases to the following schedule:

- .1 The Contractor shall receive ten percent (12%) of the cost of any materials supplied or Work properly performed by the Contractor's own forces.
- .2 The Contractor shall receive six percent (8%) of the amount owed (less fee) directly to a first-tier Subcontractor or first-tier supplier for materials supplied or for Work properly performed by that Subcontractor or supplier.
- .3 Each Subcontractor of any tier shall receive ten percent (12%) of the cost of any materials properly supplied or Work performed by its own forces.
- .4 Each Subcontractor of any tier shall receive six percent (6%) of the amount (less fee) it properly incurs for materials supplied or Work properly performed by its suppliers or Subcontractors of the next lower tier.
- .5 The Contractor and its Subcontractors of any tier shall receive five percent (5%) of any amounts owed to any remote, sub-tier Subcontractors which are within the lines of contractual responsibility but not in privity of contract with such Contractor or Subcontractors, for Work performed by that remote, sub-tier Subcontractor.
- .6 The cost to which this Fee is to be applied shall be determined in accordance with Section 7.5.
- .7 The total summed Fee of the Contractor and all Subcontractors of any tier shall not exceed twenty-six (26%) of any amounts owed to any remote, lower-tier Subcontractors that are within the lines of contractual responsibility but not in privity of contract with such Contractor or Subcontractor(s), for Work performed by that remote, lower-tier Subcontractor. If the Fee would otherwise exceed twenty-six percent (26%), the Contractor shall proportionately reduce the Fee percentage for the Contractor and all Subcontractors except for the Subcontractor supplying material or performing Work with its own forces. None of the fee percentages authorized in this Section 7.5.6 may be compounded with any other fee percentage or percentages authorized in this Section.

If a change in the Work involves both additive and deductive items, the appropriate Fee allowed will be added to the net difference of the items. If the net difference is negative, no Fee will be added to the negative figure as a further deduction. If the changed Work is performed by a wholly owned subsidiary or by a company with common ownership interests (i.e., at least 50 percent similar ownership) of the Contractor or any Subcontractor, then only the entity performing the changed Work may receive a Fee per the above schedule and the higher-tier company shall not be entitled to any Fee. The parties acknowledge that the fees listed in this Section 7.5.6 are substantially greater than the fees and overhead normally included in determining the Contract Sum bid; that these higher percentages are a sufficient amount to compensate the Contractor for all effects and impacts of Changes in the Work; and that the resultant overcompensation of the Contractor for some Changes compensates the Contractor for any Changes for which the Contractor believes the percentage is otherwise insufficient.

§ 7.5.7 The cost of any changed Work or of any other increase or decrease in the Contract Sum, including a Claim, shall not include, among other things, consultant costs, attorneys' fees, or Claim preparation expenses. Such matters are not recoverable from the Owner.

## **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 from and maintain in a company or companies lawfully authorized and admitted to do business in the jurisdiction in which the Project is located possessing an A.M. Best's policyholder's rating of A or better and a financial rating of no less than VIII and reasonably acceptable to the Owner, an occurrence-based Commercial General Liability Insurance Policy of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in this Article 11, 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 Contractor's insurance shall provide personal injury, bodily injury and property damage liability to cover the Contractor's operations, including work done on the Contractor's behalf by Subcontractors and suppliers of any tier; advertising injury; automobile liability insurance policy, including but not limited to owned, non-owned, and hired vehicles, on Work the Contractor may subcontract or sublet to others; and on the indemnity provisions of this Contract, including but not limited to premises, products/completed operations, personal injury, blanket contractual liability, explosion, collapse or underground (XCU), employment related practices coverage, and stopgap employer's liability. The Owner, its directors, officers, and agents, Architect, their consultants and employees, and any required governmental agencies and others designated in the Contract Documents shall be named as additional insureds under the Contractor's commercial general liability policy for all coverages required by Section 11.1 under form CG 20 10 11/85 or as otherwise described in the Contract Documents. The Contractor's insurance shall include a severability of interest (cross liability clause) for Work performed under this Contract. The Contractor's policy shall be designated primary coverage and non-contributory for both defense and indemnity, and any Owner's policies excess. Such limits of liability insurance shall have per project general aggregate provisions and shall not be less than the following:~~

- ~~.1 \$2,000,000 per occurrence for bodily injury liability including sickness, disease or death and \$2,000,000 bodily injury liability for all occurrences (other than automobiles);~~
- ~~.2 \$2,000,000 for property damage liability (other than automobiles) because of damage to or destruction of property of others including loss of the use thereof caused by one occurrence and \$2,000,000 property damage liability for all occurrences;~~
- ~~.3 As an alternate to subsections .1 and .2 above, the Contractor may insure for \$2,000,000 Combined Single Limit protection for both bodily injury and property damage liability per occurrence and \$2,000,000 general aggregate stop loss;~~
- ~~.4 \$1,000,000 per accident for bodily injury liability including sickness, disease or death and property damage liability because of damage to or destruction of property of others including loss of use thereof arising out of the operation of automobiles;~~
- ~~.5 \$1,000,000 for claims for damages insured by personal injury liability coverage (included and defined in the Commercial General Liability insurance policy) which are sustained (1) by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor or (2) by another person;~~
- ~~.6 \$1,000,000 for claims involving damages to a person as a result of an offense directly or indirectly related to employment of such person by the Contractor or another employee;~~
- ~~.7 \$2,000,000 for claims involving blanket contractual liability insurance (included and defined in the Commercial General Liability Insurance Policy) applicable to the Contractor's obligations under Section 3.18; and~~
- ~~.8 In addition, the Contractor shall maintain an umbrella policy that provides excess limits following form over the primary layer, in an amount not less than \$5,000,000~~
- ~~.9 If Contractor is required to furnish professional services as part of work, professional coverage required. With limits of not less than \$1,000,000 per claim and \$3,000,000 aggregate. Coverage shall remain in place through an extended period or maintenance of the original policy~~
- ~~.10 If work involves transport, dissemination, use or release of pollutant, contractor shall procure Pollution Liability with limits of not less than \$1,000,000 per claim and \$3,000,000 aggregate.~~

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§ 11.1.1.2 Before any presence on site, commencing Work or exposure to loss can occur, or, in any event, within ten days after the Owner has issued its Conditional Notice to Proceed, the Contractor shall furnish the Owner with four copies of Certificates of Insurance on AIA Document G705 or ACORD Certificate of Liability Insurance as evidence of all insurance required by the Contract Documents, including an endorsement to the insurance policies naming the Owner, its directors, officers, and agents, the Architect, their consultants and employees, any required governmental agencies and others designated in the Contract Documents as additional insureds using form CG 20 10 11/85. If the Agreement is executed, no Progress Payment will be due until all such Certificates are furnished. All policies and certificates must be signed copies and shall contain a provision that coverages afforded under the policies cannot be materially altered (i.e. the coverages reduced, the limits decreased or the additional insured removed) allowed to expire, or cancelled without first giving forty-five days prior written notice by certified mail to the Owner and Architect. The Contractor shall furnish to the Owner and Architect copies of any subsequently issued endorsements amending, modifying, altering or restricting coverage limits. Furthermore, such policies or certificates shall contain a clause verifying that the policy contains coverage for blanket contractual liability including both oral and written contracts and that liability coverages include protection for underground, collapse and explosion and that the indemnification provisions of Section 3.18 are acknowledged. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.1.1. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness. Upon written request, the Contractor will provide a copy of its policies to the Owner. The Owner's specification or approval of the insurance in this Contract or of its coverage or amount shall not relieve or decrease the liability of the Contractor under the Contract Documents or otherwise. Coverages are the minimum to be provided and are not limitations of liability under the Contract, indemnification, or applicable law provisions. The Contractor may, at its expense, purchase larger coverage amounts. Notwithstanding anything herein to the contrary, the Contractor shall provide all bonding, insurance, and permit documentation as required by governmental entities for all portions of the Project.

§ 11.1.1.3 The Contractor shall ensure and require that Subcontractors of any tier have insurance coverage to cover bodily injury and property damage on all operations and all vehicles owned or operated by Subcontractors of all tiers in the minimum amount of \$1,000,000 per occurrence with a \$2,000,000 general aggregate limit. If work involves transport, dissemination, use or release of pollutant, contractor shall procure Pollution Liability with limits not less than \$1,000,000 per claim and \$3,000,000 aggregate. Also, the Subcontractors shall name the Contractor and the Owner and cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, its directors, officers, and agents, the Architect and the Architect's consultants as additional insureds for claims arising out of or caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner, its directors, officers, and agents, as an additional insured for claims arising out of or caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations using form CG 20 10 11/85. Any design-build Subcontractors shall provide professional liability insurance in the amount of at least \$1,000,000 per occurrence.

§ 11.1.1.4 If the Owner is damaged by the failure of the Contractor to maintain any of the insurance in this Article 11 or to so notify the Owner, then the Contractor shall bear all costs attributable thereto. The Owner may withhold payment pending receipt of all certificates of insurance. Failure to withhold payment shall not constitute a waiver.

§ 11.1.1.5 Insurance requirements to operate a drone over the construction site or any other school district property. If Contractor or its Subcontractors of any tier use or operate a drone or unmanned aircraft on or over the construction site or any other property of the Owner, Contractor shall provide to Owner evidence of sufficient insurance such as aircraft liability insurance to cover any damages, including bodily injury or property damage, caused by the operation and use of such drone or unmanned aircraft prior to its use on or above the construction site or any other property of the Owner. If a Subcontractor of any tier is the operator of such a drone or unmanned aircraft, the evidence of such insurance shall be provided by that Subcontractor. The limit of liability shall be at least \$1,000,000 each occurrence.

§ 11.1.2 The Contractor shall provide surety bonds covering the faithful performance of the Contract and payment of obligations arising under the Contract Documents, each in the full amount of the Contract Sum plus sales tax, pursuant to RCW 39.08, "Contractor's Bond." All bonds shall be 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.

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The surety company shall be acceptable to the Owner, shall have an A.M. Best rating of "A-" or better and a financial rating of no less than "VIII," and shall be admitted and licensed in the State of Washington. Within ten days after the Owner's issuance of the notice of intent to award the Contract, the Contractor shall deliver evidence of its bondability to the Owner. Within ten days after its execution of the Contract, the Contractor shall deliver the originals of the bonds to the Owner and one copy to the Architect. THE OWNER MAY DECLINE TO ENTER INTO THE CONTRACT IF THE REQUESTED EVIDENCE OF BONDABILITY IS NOT RECEIVED. THE CONTRACTOR SHALL NOT PROCEED WITH THE WORK UNTIL SUCH SURETY BONDS ARE RECEIVED. Evidence of bondability shall include the percentage to be paid by the Contractor for increases in the Contract Sum.

**§ 11.1.2.1 Potential Subcontractors' Payment and Performance Bonds.** Within ten days after the issuance of the conditional notice to proceed, any Subcontractors so required in the Bidding or Contract Documents or Special Conditions shall deliver evidence of their payment and performance bondability to the Owner through the Contractor. The evidence shall include a letter from the bonding company that includes the price of a payment and performance bond to be issued during the 30-day period after the conditional notice to proceed. The surety company must be acceptable to the Owner and admitted and licensed in the State of Washington, with an A.M. Best rating of "A" or better and a financial rating of no less than "VIII." The bond(s) shall be in an amount equal to the full contract sum of the subcontract between the Subcontractor and the Contractor but shall not include sales tax. The bonds shall be conditioned that the Subcontractor shall faithfully perform all the provisions of its subcontract, payment of all obligations arising thereunder, and for one year's maintenance for correction of defective work. If the Owner elects to require a payment and performance bond from one or more of the Subcontractors, it will so notify the Contractor in writing within 14 days of receipt of the evidence of bondability from the respective Subcontractor, in which case the Contract Sum shall be increased by a Change Order in the amount specified in the letter, unless otherwise agreed by the parties. The Owner shall not be responsible for the costs of any Subcontractor bonds it requires until the Owner receives a copy of the bond. THE OWNER MAY DECLINE TO ENTER INTO THE CONTRACT OR MAY REQUIRE A CHANGE OF SUBCONTRACTOR AT NO INCREASE IN THE CONTRACT SUM OR CONTRACT TIME IF THIS EVIDENCE OF BONDABILITY IS NOT RECEIVED. THE OWNER MAY WITHHOLD PAYMENT TO THE CONTRACTOR UNTIL SUCH SURETY BONDS ARE RECEIVED. 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 permit a copy to be made. The Subcontractors responsible to the Contractor for the work listed in the Instructions to Bidders must comply with the above Section to the extent directed by the Owner.

**§ 11.1.2.2** If the Owner is damaged by the failure of the Contractor to maintain any of the bonds or insurance in this Article 11 or to so notify the Owner, then the Contractor shall bear all costs attributable thereto. The Owner may withhold payment pending receipt of all certificates of insurance and bonds. Failure to withhold payment shall not constitute a waiver.

**§ 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.

**§ 11.1.5 Insurance requirements to operate a drone over the construction site or any other S property.** If Contractor or its Subcontractors of any tier use or operate a drone or unmanned aircraft on or over the construction site or any other property of the Owner, Contractor shall provide to Owner evidence of sufficient insurance such as aircraft liability insurance to cover any damages, including bodily injury or property damage, caused by the operation and use of such drone or unmanned aircraft prior to its use on or above the construction site or any other property of the Owner. If a Subcontractor of any tier is the operator of such a drone or unmanned aircraft, the evidence of such insurance shall be provided by that Subcontractor. The limit of liability shall be at least \$1,000,000 each occurrence.



## § 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. See Section 11.6.

§ 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. See Section 11.6.

## § 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 does not waive subrogation rights to the extent of its property insurance on structures or portions of structures that do not comprise the Work. 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 that are required by the Contract Documents and that are 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.~~ Not Used.

## § 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

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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. **{Not Used}**

#### **§11.5 Adjustment and Settlement of Insured Loss **{Not Used}****

**§ 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. **Not Used**

**§ 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. **Not Used**

#### **§11.6 Property Insurance**

**11.6.1** Unless otherwise provided, the Contractor shall purchase and maintain until the Owner takes occupancy of the Project, in a company or companies lawfully authorized and admitted to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form to cover the course of construction upon the Work at the site and all materials or equipment furnished or installed by the Contractor on the Project. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project all as named insureds. This insurance shall insure against the perils of fire and extended coverage and physical loss or damage, and shall provide "all risk" coverage for the interests of the Owner, the Contractor and Subcontractors as loss payee, as their respective interests appear. Upon written request, the Contractor will provide a copy of its policy to the Owner. Each loss may be subject to a deductible of not more than \$10,000. Losses up to the deductible amount or otherwise not covered by insurance shall be the responsibility of the Contractor unless the loss was caused by the Owner or a natural disaster, in which case the Owner shall be responsible only for the deductibles allowed herein. The policy shall be endorsed to allow complete or partial occupancy by the Owner before or after Substantial Completion without the insurer's approval.

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

**§ 11.6.3** If the Contractor does not purchase such property insurance required by the Contract and with all of the coverages described above, the Contractor shall so inform the Owner in writing. The Owner may then effect insurance that will protect the interests of the Owner in the Work, and by appropriate Change Order the cost thereof shall be charged to the Contractor. If the Owner is damaged by the failure or neglect of the Contractor to purchase or maintain insurance as described herein, then the Contractor shall bear all costs properly attributable thereto.

**§ 11.6.4** This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit. All tools and equipment of the Contractor and Subcontractors of any tier not intended as part of the construction or installation of the Work will be the sole responsibility of the Contractor.

**§ 11.6.5** Upon the occurrence of a loss insured under the property insurance, the Owner shall participate in and approve the adjustment and settlement of any loss with the insurers. The Contractor shall pay Subcontractors their just shares of

insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.6.6 Before an exposure to loss may occur, the Contractor shall file with the Owner a copy of each policy that includes insurance coverages required by this Section 11.6. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Owner.

## **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;
- .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~~six (6) 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 (Not Used)

~~§ 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.~~



## **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 this certification at 19:35:20 PT on 10/25/2023 under Order No. 2114408932 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, other than changes shown in the attached final document by underscoring added text and striking over deleted text.

\_\_\_\_\_  
*(Signed)*

\_\_\_\_\_  
*(Title)*

\_\_\_\_\_  
*(Dated)*

**SECTION 00 73 43  
WAGE RATES REQUIREMENTS**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. Washington State prevailing wage rates apply to this project. Access the wage rate information as follows:
  - 1. URL to the Department of Labor & Industries Prevailing Wage Rates:  
<https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx> for current rates.
  - 2. Select Lewis County for location of public works project.
- B. The Effective Date of wage rates used for this project will be based on the bid date found in Bid Form, or as modified by addenda.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

TIMBERLAND REGIONAL LIBRARY  
MOUNTAIN VIEW LIBRARY  
December 27, 2023

01 10 00  
SUMMARY

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

**END OF SECTION**

**SECTION 01 20 00  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

**1.02 SCHEDULE OF VALUES**

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved Change Orders, with each Application For Payment.

**1.03 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit one electronic and three hard-copies of each Application for Payment.
- J. When Architect requires substantiating information, submit data justifying dollar amounts in question.

**1.04 MODIFICATION PROCEDURES**

- A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

- B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
  - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  - 2. Promptly execute the change.
- C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 2 days.
- D. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
  - 1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation as approved by the Architect..
  - 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
  - 3. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
- F. Substantiation of Costs: Provide full information required for evaluation.
  - 1. Provide the following data:
    - a. Quantities of products, labor, and equipment.
    - b. Taxes, insurance, and bonds.
    - c. Overhead and profit.
    - d. Justification for any change in Contract Time.
    - e. Credit for deletions from Contract, similarly documented.
  - 2. Support each claim for additional costs with additional information:
    - a. Origin and date of claim.
    - b. Dates and times work was performed, and by whom.
    - c. Time records and wage rates paid.
    - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
  - 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- J. Promptly enter changes in Project Record Documents.

#### **1.05 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

- B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 70 00.
  2. Proper completion of all punchlist items.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 25 00  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
  - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
  - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

**1.03 REFERENCE STANDARDS**

- A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage) Current Edition.
- B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase) Current Edition.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.
- D. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

**3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT**

- A. Submittal Time Restrictions:
  - 1. Owner will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.
- B. Submittal Form (before award of contract):

1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

### **3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

- A. Submittal Form (after award of contract):
  1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request (After Bidding/Negotiating). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Submit request for Substitution for Cause immediately upon discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience within 14 days of discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
  1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
  2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
  3. Bear the costs engendered by proposed substitution of:
    - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
    - b. Other construction by Owner.
    - c. Other unanticipated project considerations.
- D. Substitutions will not be considered under one or more of the following circumstances:
  1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
  2. Without a separate written request.
  3. When acceptance will require revisions to Contract Documents.

### **3.04 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.

### **3.05 ACCEPTANCE**

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

### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record.

**END OF SECTION**

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Submittals for review, information, and project closeout.
- F. Number of copies of submittals.
- G. Requests for Information (RFI) procedures.
- H. Submittal procedures.

**1.02 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRECONSTRUCTION MEETING**

- A. Schedule meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect.
  - 3. Contractor.
- C. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
  - 5. 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.
- D. Record minutes and distribute copies within two days after meeting to participants, with PDF format copies to Architect, Owner, participants, and those affected by decisions made.

**3.02 PROGRESS MEETINGS**

- A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
  - 1. Contractor.
  - 2. Owner.
  - 3. Architect.
  - 4. Contractor's superintendent.
  - 5. Major subcontractors.
- C. 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 RFIs log and status of responses.
  7. Maintenance of progress schedule.
  8. Corrective measures to regain projected schedules.
  9. Planned progress during succeeding work period.
  10. Maintenance of quality and work standards.
  11. Effect of proposed changes on progress schedule and coordination.
  12. Other business relating to work.
- D. Record minutes and distribute copies within two days after meeting to participants, with PDF format copies to Architect, Owner, participants, and those affected by decisions made.

### **3.03 CONSTRUCTION PROGRESS SCHEDULE**

- A. Within 10 days after date of the Agreement, submit schedule for the work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 5 days after joint review, submit complete schedule.

### **3.04 REQUESTS FOR INFORMATION (RFI)**

- A. Definition: A request seeking one of the following:
  1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. 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 the Architect.
  3. 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.
  1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).

3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, 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.
- H. Review Time: Architect will respond and return RFIs to Contractor within 14 calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 3:00 PM 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.
- I. Submit RFI's in a manner to not unreasonably encumber the Architects ability to review and comment in the allowed time frame. Excessive and/or frivolous RFI's will result in extended review periods.
- J. 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.

### **3.05 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 for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

### **3.06 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.

### **3.07 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
  1. Project record documents.
  2. Operation and maintenance data.
  3. Warranties.
  4. Bonds.
  5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.08 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one or two 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.

### **3.09 SUBMITTAL PROCEDURES**

- A. General Requirements:
  1. Use a separate transmittal for each item.
  2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  3. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Architect.
  4. Sequentially identify each item. For revised submittals use original number and a sequential revision number suffix.
  5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.

6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Send submittals in electronic format via email to Architect.
  8. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 10 days excluding delivery time to and from the Contractor.
  9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  10. Provide space for Contractor and Architect review stamps.
  11. When revised for resubmission, identify all changes made since previous submission.
  12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
  13. Submittals not requested will not be recognized or processed.
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  2. Do not reproduce Contract Documents to create shop drawings.
  3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
1. Transmit related items together as single package.
  2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

### **3.10 SUBMITTAL REVIEW**

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt, but will take no other action.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
  1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

**END OF SECTION**

**SECTION 01 32 16  
CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

**1.02 SUBMITTALS**

- A. Within 10 days after date of Agreement, submit preliminary schedule.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
- C. Submit updated schedule with each Application for Payment.
- D. Submit in PDF format.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRELIMINARY SCHEDULE**

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

**3.02 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- E. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.
- F. Provide legend for symbols and abbreviations used.

**3.03 BAR CHARTS**

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

**3.04 REVIEW AND EVALUATION OF SCHEDULE**

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

**3.05 UPDATING SCHEDULE**

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.



**3.06 DISTRIBUTION OF SCHEDULE**

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

**END OF SECTION**

**SECTION 01 40 00  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Tolerances.
- I. Manufacturers' field services.
- J. Defect Assessment.

**1.02 REFERENCE STANDARDS**

- A. IAS AC89 - Accreditation Criteria for Testing Laboratories 2021.

**1.03 DEFINITIONS**

- A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
  - 1. Design Services Types Required:
    - a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor's sole responsibilities for construction means, methods, techniques, sequences, and procedures.
    - b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
- B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

**1.04 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
  - 1. Temporary sheeting, shoring, or supports.
  - 2. Temporary scaffolding.
  - 3. Temporary bracing.
  - 4. Temporary stairs or steps required for construction access only.

**1.05 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.

### 1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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.
  - 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
  - 2. Include required product data and shop drawings.
  - 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
  - 4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
- C. 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.
- D. 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.
- E. 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.
- F. 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.

### 1.07 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.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

#### **1.08 REFERENCES AND STANDARDS**

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

#### **1.09 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Owner will employ and pay for services of an independent testing agency to perform other specified testing and inspection.
- 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 CONTROL OF INSTALLATION**

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

#### **3.02 MOCK-UPS**

- A. Before installing portions of the Work where mock-ups are required, for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. 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. 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. Where possible salvage and recycle the demolished mock-up materials.

### **3.03 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

### **3.04 TESTING AND INSPECTION**

- A. See individual specification sections for testing and inspection required.
- B. 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. Contractor shall be responsible for coordination of all required testing/inspection with Testing Laboratory, Architect, Engineer, Building Official, and Owner.
  - 2. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 3. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  - 4. 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.
  - 5. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  - 6. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  - 7. 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-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

**3.05 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship 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 01 41 23  
PERMITS AND FEES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Permits and Fees..

**1.02 PERMITS AND FEES**

- A. Owner Responsibilities:

1. Permits:
  - a. Building Permit: Owner will submit application, Drawings, and Specifications. Contractor will secure Permit from the Building Department.
2. Fees:
  - a. Plan Check fee (building department) - Paid by Owner
  - b. Building (General) Permit fee - Paid by Owner
  - c. Water System Development Charge - Paid by Owner
  - d. Sewer System Development Charge - Paid by Owner
  - e. Traffic Impact fee (exempt)

- B. Contractor Responsibilities:

1. Permits and Fees: The Contractor shall be responsible for procuring and paying for the permits listed, including but not limited to:
  - a. Building Permit procurement (secure from the issuing agency, Owner will pay fee).
  - b. Electrical Permit - By Owner
  - c. Mechanical Permit - procurement
  - d. Plumbing Permit - procurement
  - e. Demolition Permit - procurement
  - f. Department of Health Permit.
  - g. Potable Water Permit
  - h. All permits and fees for plan reviews, permits and inspections required by Fire Marshal (including deferred submittals)
  - i. All other permits required during the construction phase to secure the final occupancy permit.
  - j. Any permits/fees required by individual specification sections.

**1.03 PAYMENTS**

- A. The Contractor shall be responsible for securing and paying for permits and fees under their responsibility, in a timely manner so not to impede the progress of the Work.
- B. Prior to Substantial Completion of the Work, Contractor shall verify that all fees have been paid so not to impede issuance of Occupancy Permit.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 42 16  
DEFINITIONS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.

**1.02 DEFINITIONS**

- A. Basis-of-Design (BOD):
  - 1. Product or system used to establish a particular quality, performance requirement, aesthetic, or other specific attribute for that product or system for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or in an approved Substitution Request as judged by the Design Professional.
  - 2. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of the parties involved in and furnishing the substitutes to verify and compare the characteristics, performance and requirements of that furnished to that specified and/or shown.
  - 3. Drawings are intended to be diagrammatic and reflect the Basis-of-Design manufacturer's product/equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of proposed approved comparable products/equipment to assure that they will fit in available space the same as the Basis-of-Design products/equipment.
- B. Furnish: To supply, deliver, unload, and inspect for damage.
- C. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- D. OFCI; Owner Furnished, Contractor Installed.
- E. OFOI: Owner Furnished, Owner Installed.
- F. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- G. Provide: To furnish and install.
- H. Supply: Same as Furnish.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 JOB CONDITIONS**

- A. Use all means necessary to maintain temporary facilities and controls in proper and safe conditions throughout progress of the Work.
- B. Obtain prior approval from all utility providers before proceeding with any Work, which would disrupt service to their customers.
- C. Comply with federal, state, and local codes and regulations.

**1.03 TEMPORARY UTILITIES**

- A. For New Facilities, provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

**1.04 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

**1.05 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.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.06 FENCING**

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

**1.07 EXTERIOR ENCLOSURES**

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

**1.08 SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

**1.09 VEHICULAR ACCESS AND PARKING**

- A. Coordinate access and haul routes with governing authorities and Owner.

- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Existing parking areas may be used for construction parking.

**1.10 WASTE REMOVAL**

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

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 60 00  
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 SUBMITTALS**

- A. 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.
- B. 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.
- C. 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.

**1.03 PRODUCT WARRANTIES**

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by Contract Documents to provide specific rights for Owner.
  - 3. The Contractor is not relieved from delivering to the Owner warranties of longer duration if these are industry-accepted standards,
- B. Special Warranties: Prepare written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included with Specifications, prepare written document using indicated form properly executed.
  - 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 70 00, Execution and Closeout Requirements and individual technical sections of the Specifications.

**PART 2 PRODUCTS**

**2.01 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.

## **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 01 25 00 - Substitution Procedures.

### **3.02 OWNER-SUPPLIED PRODUCTS**

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

### **3.03 TRANSPORTATION AND HANDLING**

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

### **3.04 STORAGE AND PROTECTION**

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.

- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.
  - 1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- 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. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

### **3.05 DAMAGED PRODUCTS**

- A. Damaged or deteriorated materials shall be removed from the premises and replaced with new.

**END OF SECTION**

**SECTION 01 70 00  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Pre-installation meetings.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

**1.02 QUALIFICATIONS**

- A. For surveying work, employ a land surveyor registered 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. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- B. 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.

**1.03 PROJECT CONDITIONS**

- A. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- C. 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.
  - 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
  - 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- D. 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.
- E. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- F. 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.

**1.04 COORDINATION**

- A. See Section 01 10 00 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.

- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

## **PART 2 PRODUCTS - NOT USED**

## **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.
- 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. 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 PDF format 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 recognized engineering survey practices.
- H. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- I. 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, and \_\_\_\_\_.
- J. Periodically verify layouts by same means.
- K. Maintain a complete and accurate log of control and survey work as it progresses.
- L. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

### **3.05 GENERAL INSTALLATION REQUIREMENTS**

- A. 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. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

### **3.06 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-complying work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- E. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.
- F. Patching:



1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.07 PROGRESS CLEANING**

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

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

### **3.09 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.
- H. All private storm and sanitary sewer pipes following trench backfill and complete installation shall be video inspected. The video information shall be submitted and demonstrate no manufacturing or installation defects, or any debris in the pipes.

### **3.10 DEMONSTRATION AND INSTRUCTION**

- A. See Section 01 79 00 - Demonstration and Training.

### **3.11 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.12 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
  1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.

- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Ventilating systems:
  - 1. Clean permanent filters and replace disposable filters if units were operated during construction.
  - 2. Clean ducts, blowers and coils if units were operated without filters during construction.
- H. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- I. Clean site; sweep paved areas, rake clean landscaped surfaces.
- J. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.13 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect and Owner.
- B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- C. 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.
- D. Complete final start-up, testing and commence instruction/training on all major building systems including HVAC and controls, intercom, data, fire alarm, telephone, fire sprinkler, security, and clocks.
- E. Make final changeover of locks and transmit keys to Owner. Final keying by Owner.
- F. Advise Owner on coordination of shifting insurance coverages.
- G. Owner will occupy all of the building as specified in Section 01 10 00.
- H. 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.
- I. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- J. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- K. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

### **3.14 WARRANTY**

- A. Provide all required warranties as outlined in the General Conditions of the Contract for Construction, Division 01 Administrative Requirements and individual specification sections.
- B. Prior to expiration of the one year warranty on all Work, the Architect and Owner will conduct an inspection and survey to notify the Contractor of any items for corrective action.

**3.15 FINAL COMPLETION**

- A. Contractor to submit final closeout documentation.
- B. Submit a final statement of accounting to the Architect, showing all adjustments to the Contract sum. If so required, the Architect will prepare a final Change Order showing adjustments to the Contract sum, which were not made previously by Change Order.
- C. Contractor will notify Architect of final completion.
- D. The Architect will inspect to verify status of completion.
- E. Should the Architect determine that the Work is incomplete or defective:
  - 1. The Architect will notify the Contractor, in writing, listing the incomplete or defective Work.
  - 2. The Contractor will remedy the deficiencies promptly, and notify the Architect when ready for re-inspection.
- F. When the Architect determines the project is complete, Architect will prepare letter of final completion.

**END OF SECTION**

**SECTION 01 78 00  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
  - 2. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 2. 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.

**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. Product substitutions or alternates utilized.
  - 2. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Field changes of dimension and detail.
  - 2. Details not on original Contract drawings.

**3.02 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.

- 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. Additional information as specified in individual product specification sections.
- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### **3.03 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. Include test and balancing reports.
- M. Additional Requirements: As specified in individual product specification sections.

### **3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

### **3.05 WARRANTIES AND BONDS**

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

**END OF SECTION**

**SECTION 01 79 00  
DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
  - 1. All software-operated systems.
  - 2. HVAC systems and equipment.
  - 3. Plumbing equipment.
  - 4. Electrical systems and equipment.
  - 5. Landscape irrigation.
  - 6. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
  - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
  - 2. Finishes, including flooring, wall finishes, ceiling finishes.
  - 3. Fixtures and fittings.
  - 4. Items specified in individual product Sections.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit to Architect for transmittal to Owner.
  - 2. Submit not less than four weeks prior to start of training.
  - 3. Revise and resubmit until acceptable.
  - 4. Provide an overall schedule showing all training sessions.
  - 5. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.
    - d. Intended audience, such as job description.
    - e. Objectives of training and suggested methods of ensuring adequate training.
    - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    - g. Media to be used, such as slides, hand-outs, etc.
    - 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.

- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
  - 1. Format: DVD Disc, or as requested by Owner.
  - 2. Label each disc and container with session identification and date.

### **1.03 QUALITY ASSURANCE**

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

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 DEMONSTRATION - GENERAL**

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
  - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

### **3.02 TRAINING - GENERAL**

- A. The Contractor will instruct the Owner's personnel in proper operation and maintenance of systems, equipment, and similar items which were provided as part of the Work. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments. Provide sign-in records of all participants.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  - 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
  - 1. Review the applicable O&M manuals, and record documents.
  - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including



- preventative maintenance.
- 4. Provide hands-on training on all operational modes possible and preventive maintenance.
- 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
- 6. Discuss common troubleshooting problems and solutions.
- 7. Discuss any peculiarities of equipment installation or operation.
- 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
- 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
- 10. Review spare parts and tools required to be furnished by Contractor.
- 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

**END OF SECTION**

**SECTION 02 40 00  
DEMOLITION**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. See Section 31 25 00 for Erosion and Sedimentation Control.
- D. Where existing site utilities are to be abandoned or removed the following sections shall take precedence over the requirements in this section:
  - 1. Section 33 11 13 Water System
  - 2. Section 33 41 14 Storm Drainage
- E. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
  - 1. American National Standards Institute (ANSI)
    - a. ANSI A 10.6: (1990) Demolition Operations
- F. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to perform the following work:
  - 1. All work associated with the complete demolition and removal of existing site structures.
  - 2. Removing above-grade, at-grade, and below-grade improvements.
  - 3. Removal of all elements of prior development, including debris, garbage, fences, concrete pads, and other such items.
  - 4. Disconnecting, capping or sealing, and abandoning site utilities in place, including backfill and compaction.
  - 5. Disconnection, capping or sealing, and removing site utilities, including backfill and compaction.

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

**1.05 PROJECT CONDITIONS**

- A. Traffic

1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.
- B. Utilities Locate
  1. Contractor shall call for utility locator service for the project area prior to any grading, excavation or utility work.
- C. State and local code requirements shall control disposal of debris, which shall be at an approved off-site location.

#### **1.06 SALVAGE**

- A. Items not designated for salvage or removal by the Owner shall become the contractor's property for his/her removal and legal salvage.

#### **1.07 RECYCLING**

- A. The Owner encourages voluntary Contractor participation in recycling programs for any appropriate materials generated by demolition activities.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Utility Markers
  1. Plastic cap markers shall be Berntsen Plastic Utility Markers for Rebar, code BFPCAP4-U or equal (<http://www.berntsen.com/Go-Shopping/Utilities/Plastic-Utility-Markers/Plastic-Utility-Markers-for-Rebar>).
- B. Erosion Control
  1. See Section 31 25 00 Erosion and Sedimentation Control.
- C. Backfill Materials
  1. See Section 31 22 00 Grading.

### **PART 3 EXECUTION**

#### **3.01 GENERAL**

- A. Hours of Operation
  1. All work shall be performed within the standard hours of operation as allowed by the AHJ's local Code.
  2. No construction equipment shall be started or operated outside the allowed hours of operation, this includes warm-up of equipment.
- B. Access
  1. Maintain access to the site per the requirements of the site plan.
  2. Maintain clear access to all fire hydrants at all times.
  3. Do not obstruct the Owner's use of and access to any part of the site without prior written permission from owner.
- C. Worker Safety
  1. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed.

2. Do not allow worker or public access within range of potential collapse of unstable structures.
3. Provide, erect and maintain temporary barriers and security devices.
4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

D. Hazardous Materials

1. Asbestos
  - a. With regard to asbestos, the hazardous materials survey consultant will endeavor to locate all the suspect asbestos-containing materials in the structures; however, suspect asbestos-containing materials may be present and concealed within wall, ceiling, or floor spaces. If suspected asbestos materials are uncovered during demolition activities, stop work and notify Owner immediately so that additional testing and/or abatement work can be performed.
2. Other Hazardous Materials
  - a. If suspected hazardous materials are uncovered during demolition activities, stop work and notify Owner immediately so that additional testing and/or abatement work can be performed.

**3.02 CONSTRUCTION REQUIREMENTS**

A. Pre-Demolition Conference

1. Conduct a Pre-demolition Conference on-site. The Project Superintendent shall be present. Coordination requirements of the various trades shall be discussed.

B. Demolition

1. Perform all demolition work as required for the execution and completion of this contract, as shown on the drawings, as specified, and as required to make the project complete and operable.
2. Burning of any kind and use of explosives shall not be permitted.
3. Comply with federal, state, and local hauling and disposal regulations. Safety requirements shall conform to ANSI A10.6.
4. Coring machines and concrete saws shall be used in lieu of pneumatic or electric driven impact tools.
5. Do not use water as a tool in demolition activities, including pressure washing, jetting, etc.
6. Contractor shall perform a final inspection of demolition, make all necessary corrections, and ensure completion prior to calling the Owner for finish inspection.

C. Existing Utilities

1. General
  - a. Locate, cut, cap and abandon existing utilities as indicated on the Drawings.
2. Backfill and Compaction
  - a. Voids from removal of existing utilities or utility structures shall be backfilled and compacted in accordance with Section 31 22 00 Grading.
3. Markers

- a. Provide markers for future locating of utilities. Drive 12" long #4 rebar into the ground and install UCC color coded plastic cap at grade.
4. As-builts
  - a. The location of found underground utilities shall be noted by the contractor during construction. Upon completion of the work, the contractor shall be responsible for providing a redline drawing to the owner noting the location of all placed markers and all found utilities.
5. Coordination
  - a. Where utilities are required to be abandoned by utility purveyor crews, perform all necessary coordination efforts.
- D. Dust Control and Debris Removal
  1. Take all necessary and required precautions in controlling dust generated from the demolition operations.
  2. Control and protect all drain systems from contamination by run-off from dust and debris.
  3. Debris from demolition work shall be disposed of legally at an approved off-site facility.
- E. Temporary Erosion and Sedimentation Control
  1. Refer to Section 31 25 00, Erosion and Sedimentation Control, for requirements.
  2. Refer to the Drawings for plan and details.

### **3.03 QUALITY ASSURANCE**

- A. The Contractor is responsible for project quality control in ensuring that the project work is performed per the Drawings and specifications.
  1. The work includes demolition or removal of all construction indicated or specified. Do not begin demolition until authorization is received from the Owner's representative. Remove rubbish and debris daily, unless otherwise directed; do not allow accumulations inside or outside the building. Store materials that cannot be removed daily in areas specified by the Owner's representative.
  2. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section
- B. The Owner is responsible for project quality assurance, to the satisfaction of the Owner. The Owner may retain a Testing Agency to perform on site observation and testing during construction operations. The services of the Testing Agency may include, but are not limited to, the following:
  1. Observation of compaction of subgrades.
  2. Observation during placement and compaction of material.
  3. Observation of removal of foundations.
  4. Observation during placement and compaction of backfill utility trenches.
  5. Observe construction and perform water content, gradation, and compaction tests at a frequency and at locations determined by the Geotechnical Consultant. The results of these tests will be submitted to the Owner and Engineer, a copy to the Contractor, on a timely basis so that the Contractor can take such action as is required to remedy indicated deficiencies. During the course of construction, the Testing Agency will advise the Owner

and Engineer in writing with a copy to Contractor if, at any time, in his opinion, the work is not in substantial conformity with the Contract Documents.

6. Observation of fills following interruptions by rains or other inclement weather.
- C. Neither the presence of the Geotechnical Consultant, nor any observations and testing performed shall excuse the Contractor from defects discovered in the work.
- D. The Owner reserves the right to modify or waive Testing Agency services.
- E. Payment for initial material testing shall be the responsibility of the Owner. Costs for any test(s) which must be repeated on materials that have failed to meet specifications shall be the responsibility of the Contractor.

### **3.04 PROTECTION**

- A. Protect from damage those portions of the site which are to remain undisturbed. Damage to existing buildings, landscaping, hardscape or other property shall be repaired at the Contractor's expense.
- B. Do not store equipment nor materials adjacent to trees (under area of branch/limb overhang).
- C. Tree Protection
  1. Except when excavating directly adjacent to existing trees, erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
  2. When excavating within the drip line of existing trees, use extreme caution so as to not damage existing tree roots.
  3. When roots are encountered, use hand-held non powered equipment to complete excavation work. The owner or engineer shall observe any exposed roots and determine limits of potential removal. Do not rip or tear existing tree roots. Any roots to be removed shall be cut with a saw after approval by the owner or their representative.

END OF SECTION

**SECTION 03 30 00  
CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete foundation walls.
- D. Concrete reinforcement.
- E. Joint devices associated with concrete work.
- F. Miscellaneous concrete elements, including equipment pads, thrust blocks, and manholes.
- G. Concrete curing.

**1.02 REFERENCE STANDARDS**

- A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
- B. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.
- C. ACI 301 - Specifications for Concrete Construction 2020.
- D. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting 2020.
- G. ACI 306R - Guide to Cold Weather Concreting 2016.
- H. ACI 308R - Guide to External Curing of Concrete 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- J. ACI 347R - Guide to Formwork for Concrete 2014 (Reapproved 2021).
- K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- L. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars 2022.
- M. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2023.
- N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
- O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2023.
- P. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2020.
- S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- T. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete 2023.
- U. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- V. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2023, with Editorial Revision.

- W. ASTM C845/C845M - Standard Specification for Expansive Hydraulic Cement 2018.
- X. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- Y. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.
- Z. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.
- AA. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- BB. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- CC. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars 2021.
- DD. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers 2020.
- EE. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric) 2014.
- FF. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.
- GG. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs 2017 (Reapproved 2023).

### **1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Refer to Structural Drawings for additional requirements.
- B. In the event of conflicting requirements between structural notes and the requirements in this Specification, the most stringent requirements apply.

### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
  - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
  - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Test Reports: Submit report for each test or series of tests specified.

### **1.05 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Pre-Installation Conference: Prior to placement of concrete slabs, Schedule and administer a conference on site to review finishing techniques, use of additives and curing compounds, curing procedure and drying procedure. Attendees to include Contractor's superintendent, concrete supplier, concrete placement and finishing contractor, Architect, inspection and testing firm representative, and Owner's representative.



- E. For concrete slabs, maintain maximum water-to-cement ratio as indicated in specified mix design.
- F. It is the responsibility of the Contractor to ensure that all concrete slabs will achieve a moisture content acceptable to the manufacturer of the flooring material at the time scheduled for installation so there is no delay in completion date.
- G. Any delay in substantial completion of the project due to unacceptable concrete moisture levels will not be considered as justification for extension of time.
- H. If concrete moisture levels are above acceptable limits for installation of finish flooring, the Contractor is responsible to employ measures that allow installation of the finish flooring without voiding standard or specified warranties, and will not delay completion.
  - 1. See Section 09 05 61 - Common Work Results for Flooring Preparation.
- I. For slabs scheduled to be sealed, refer to 03 35 11 Concrete Floor Finishes for protection requirements.

## **PART 2 PRODUCTS**

### **2.01 FORMWORK**

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
  - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
  - 2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
  - 3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
  - 4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

### **2.02 REINFORCEMENT MATERIALS**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
  - 1. Type: Deformed billet-steel bars.
  - 2. Finish: Unfinished, unless otherwise indicated.
  - 3. Finish: Epoxy coated in accordance with ASTM A775/A775M as indicated.
- B. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
  - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.
- C. Refer to Structural Drawings for additional requirements.
- D. In the event of conflicting requirements between structural notes and the requirements in this Specification, the most stringent requirements apply.
- E. In the event of conflicting requirements between structural notes and the requirements in this Specification, the most stringent requirements apply.

### **2.03 CONCRETE MATERIALS**

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
  - 1. Acquire cement for entire project from same source.
- B. Blended, Expansive Hydraulic Cement: ASTM C845/C845M, Type K.
- C. Fine and Coarse Aggregates: ASTM C33/C33M.

1. Acquire aggregates for entire project from same source.
  2. Ensure that all aggregates for any concrete to remain exposed to view have not been saturated with salt water.
  3. Coarse aggregates to be clean, uniformly hard, durable particles of gravel or crushed stone.
    - a. Slabs-on-Grade: Maximum size 1 inch.
  4. Fine aggregates to be clean, hard, durable particles of natural sand, free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C330/C330M.
- E. Fly Ash: ASTM C618, Class C or F.
- F. Slag: ASTM C989, Grade 120.
- G. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

#### **2.04 ADMIXTURES**

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
  1. Application: Do not use at concrete scheduled to be left exposed, sealed or dry-polished.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. Mid-to-High Range Water Reducing Admixture: ASTM C494/C494M, Type A or F
  1. Manufacturer's:
    - a. BASF Corporation; MasterPolyheed 997: [www.master-builders-solutions.basf.us](http://www.master-builders-solutions.basf.us).
    - b. W.R. Grace & Co.; Daracem 19 or 55; [www.grace.com](http://www.grace.com)
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Retarding Admixture: ASTM C494/C494M Type B.
- H. Water Reducing Admixture: ASTM C494/C494M Type A.
- I. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- J. Shrinkage Reducing Admixture:
  1. ASTM C494/C494M, Type S.
- K. Accelerating Admixture: ASTM C494/C494M, Type C, without calcium chloride.

#### **2.05 ACCESSORY MATERIALS**

- A. Underslab Vapor Retarder:
  1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.
  2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
  3. Manufacturers:
    - a. ISI Building Products; Viper VaporCheck II 15-mil (Class A): [www.isibp.com/#sle](http://www.isibp.com/#sle).
    - b. Stego Industries, LLC; ; Stego Wrap Vapor Barrier 15-mil (Class A): [www.stegoindustries.com/#sle](http://www.stegoindustries.com/#sle).
    - c. W. R. Meadows, Inc; PERMINATOR Class A - 15 mils (0.38 mm): [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  1. Grout: Comply with ASTM C1107/C1107M.

2. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.

## 2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
- B. Epoxy Bonding System:
  1. Complying with ASTM C881/C881M and of Type required for specific application.
- C. Reglets: Formed steel sheet, galvanized, of not less than 0.022-inch- (0.55-mm-) thick with temporary filler to prevent concrete intrusion during placement.
  1. Size: As indicated on drawings.
- D. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
  1. Material: ASTM D1751, cellulose fiber.
  2. Manufacturers:
    - a. Nomaco, Inc; Nomaflex Expansion Joint Filler with Void Cap Option:  
[www.nomaco.com/#sle](http://www.nomaco.com/#sle).
    - b. W. R. Meadows, Inc; Fiber Expansion Joint Filler with Snap-Cap:  
[www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.07 CURING MATERIALS

- A. Moisture-Retaining Sheet: ASTM C171.
  1. Manufacturers:
- B. Water: Potable, not detrimental to concrete.

## 2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete design mixes are the responsibility of the manufacturer to achieve strengths noted, except where specific requirements are indicated below in concrete mix descriptions.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer unless specific requirements are listed in concrete mix design.
- D. Normal Weight Concrete for Footings, Foundations:
  1. Compressive Strength: Reference Structural Drawings.
  2. Supplementary Cementitious Materials: Mix to contain either fly ash or slag per Structural Drawings.
  3. Maximum Slump for Footings and Foundation Walls: 4 inches, plus or minus 1 inch.
  4. Maximum Slump for Structural Slabs: 4 inches, plus or minus 1-1/2 inch.
- E. Normal Weight Concrete for Interior Slabs - **Type 'A' Slab**:
  1. Application: All interior slabs scheduled to receive an applied floor finish.
  2. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: Per Structural Drawings.
  3. Supplementary Cementitious Materials: Mix to contain either fly ash or slag per Structural Drawings.
  4. Aggregates: Per Structural Drawings.
  5. Fiber Reinforcement: Per Structural Drawings.
  6. Water-Cement Ratio: Per Structural Drawings.
  7. Admixtures:
    - a. Mid-to-High Water Reducing Admixture: In accordance with concrete supplier recommendations.
    - b. Shrinkage Reducing Admixture: Per Structural Drawings.

8. Maximum Slump: 5 inches, plus or minus 1 inch.

## **2.09 MIXING**

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

### **3.02 PREPARATION**

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance with bonding agent manufacturer's instructions.
  1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
  2. Use latex bonding agent only for non-load-bearing applications.
- E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
- F. Interior Slabs on Grade Sub-base: Compacted under-slab granular base, compacted to 95 percent of maximum dry weight in accordance with ASTM D1557:
  1. 6-inch base course of 1-1/4 inch minus crushed rock over native soils or structural fill.
- G. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade, lapping parallel with direction of pour. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
  1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.
  - 2.
  3. Inspect all surfaces of barrier and apply a patch over any torn or damaged surface. Lap patches over damaged areas 6 inches minimum. Inspection of Vapor Barrier: Refer to Field Quality Control requirements.
  - 4.
  5. Remove any water from the surface of the vapor barrier with portable, high speed air blowers, just prior to placing concrete.

### **3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS**

- A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
- B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

### 3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Architect Owner's Representative, Building Department and Inspection and Testing Firm not less than 24 hours prior to commencement of placement operations. Refer to Field Quality Control Requirements.
  - 1. Do not place concrete until forms are properly braced, cleaned of foreign matter, all reinforcing and embedded items are in place and inspected and approved by the Architect, Building Department and Inspection and Testing Firm.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- G. Deposit concrete continuously and at such a rate that the concrete being placed is intermixed thoroughly with previously deposited concrete without formation of seams, planes of weakness or rock pockets.
- H. Internally vibrate all concrete around reinforcing steel, embedded items, into all corners of forms, eliminating air and rock pockets. Concrete is not to move horizontally with the vibrator.
- I. Experienced workmen to handle vibrators. A spare vibrator, in good working condition, is to be kept on the job site at all times during concrete placement operations.
- J. Do not place (drop) concrete from a height greater than 6 feet.
- K. For interior concrete slabs, after rodding or laser screed, skip float with a bull float.
- L. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.
- M. Do not add water to the concrete mix at the job site without approval of the Architect.

### 3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
  - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Load Transfer Construction and Contraction Joints: Install load transfer devices as indicated; saw cut joint at surface as indicated for contraction joints.
- E. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 1 to 4 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab. Provide where indicated on drawings, or if not indicated, provide at spacing as follows:
  - 1. Type 'A' Slabs: 12 feet on center between joints, maximum.
  - 2. Type 'C' Slabs: 12 feet on center between joints, maximum.
- F. Bulkhead Joints: Joints to provide bond break between pours.

### 3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for compliance with specified tolerances.
- B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
  - 1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
  - 2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
  - 3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
  - 4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
- C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

### 3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
  - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  - 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
  - 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
  - 3. Decorative Exposed Surfaces: Trowel as described in ACI 302.1R; take measures necessary to avoid black-burnish marks; decorative exposed surfaces include surfaces to receive liquid hardeners, surfaces to receive dry-shake hardeners, and all other exposed slab surfaces.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

### 3.08 CURING AND PROTECTION

- A. Comply with requirements of 03 35 11, Concrete Floor Finishes, 1.05 Quality Assurance,"Protection".
- B. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  - 1. Normal concrete: Not less than seven days.
  - 2. High early strength concrete: Not less than four days.
- D. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- E. Surfaces Not in Contact with Forms:

1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
2. Slabs to Remain Exposed with no Adhesive-Applied Flooring: Ensure that selected cure method will not cause color variations in the finished surface. Plastic sheeting is not to be used for cover.
3. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
  - a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 3 days.
  - b. Spraying: Spray water over floor slab areas and maintain wet.
  - c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
4. Final Curing: Begin after initial curing but before surface is dry. Get concrete slabs "dry" in buildings that are "closed-in" as soon as possible. For a minimum of 90 days prior to installation of finish flooring:
  - a. Maintain a minimum air temperature of 65 degrees F at night and 60 degrees F during the day.
  - b. Maintain a maximum relative humidity of 45 percent.
  - c. Maintain ventilation of one and one half air changes per hour, minimum.

### **3.09 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. The vapor barrier is to be inspected by the Architect prior to placing slab-on-grade concrete. Provide a minimum of 24 hours notice. Concrete slab is not to be placed without approval of vapor barrier installation by the Architect.
- E. With each load of concrete delivered to the site, furnish delivery batch ticket to the Contractor. Delivery tickets to be kept on file, on site by the Contractor's superintendent, and made available to the Architect, upon request. Batch ticket to show batch weights of:
  1. Cementitious materials.
  2. Water.
  3. Aggregates.
  4. Additives.
- F. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- G. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- H. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

### **3.10 DEFECTIVE CONCRETE**

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

**3.11 PROTECTION**

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

**END OF SECTION**



**SECTION 03 35 11  
CONCRETE FLOOR FINISHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface treatments for concrete floors and slabs.
- B. Liquid densifiers and hardeners.
- C. Clear coatings.
- D. Clear penetrating sealers.

**1.02 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with concrete floor placement and concrete floor curing.
- B. Pre-Installation Conference: Conduct conference at the Project Site to verify project requirements, finishing techniques, protection requirements and warranty requirements. Attendees to include Owner, Architect, Contractor, concrete slab subcontractor, concrete supplier and concrete finish applicator.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

**1.04 1.04 QUALITY ASSURANCE**

- A. A. Manufacturer's Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience installing projects of similar scope and size.
  - 1. 1Company to be certified as an approved installer by manufacturer, with current certificate.
- C. Protection:
  - 1. There is no satisfactory way to repair a damaged concrete surface. Protection is therefore essential.
    - a. Place slab after super structure and slab above is in place.
    - b. Sweep slab to remove all loose dirt, sand, rocks or other construction debris. Cover slab with cloth mat, then cover slab with 1/2-inch plywood.
    - c. Grind, stain and polish slabs prior to framing walls, then reinstall protection per item above except at wall locations.
    - d. Frame walls and install interior finishes.
    - e. Remove plywood and cloth mat. Re-polish floors.
    - f. Cover floors with craft paper after polishing is completed until final cleaning.
  - 2. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential.
    - a. All hydraulic powered equipment must be diapered to avoid staining of the concrete.
    - b. No trade will park vehicles on the interior slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
    - c. No pipe cutting machine will be used on the interior floor slab.
    - d. Steel will not be placed on interior slab to avoid rust staining.
    - e. All equipment must be equipped with non-marking tires.

**1.05 MOCK-UP**

- A. Mock-Up Size: 10 feet square.

- B. Locate where directed by Architect.
  - 1. Notify Architect and Owner Representative seven days in advance of date and time when mock-up will be constructed.
  - 2. Obtain approval of mock-up from Architect and Owner Representative prior to proceeding with work.
  - 3. If Architect and Owner determine that mock-up does not meet the requirements re-install mock-up in alternate approved location for approval, using same procedure outlined above.
- C. Approved mock-ups are to be maintained in an undisturbed condition as a standard for judging the completed work.
- D. Mock-up may remain as part of the work as long as the mock-up has remained undisturbed at the time of Substantial Completion.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

#### **1.07 FIELD CONDITIONS**

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Maintain substrate and ambient temperature and humidity in accordance with manufacturer's written instructions.
- C. Perform the work of this Section in well-ventilated areas, under roof cover and with walls in place.

### **PART 2 PRODUCTS**

#### **2.01 CONCRETE FLOOR FINISH APPLICATIONS**

- A. Unless otherwise indicated, all concrete floors are to be finished using liquid densifier/hardener.
- B. Liquid Densifier and Hardener:
  - 1. Use at following locations: Exposed concrete slab floors.
- C. Clear Coating:
  - 1. Use at following locations: Exposed concrete slabs.

#### **2.02 SURFACE TREATMENTS**

- A. Troweling Aid, Densifier and Curing Agent: Liquid reactive colloidal silica-based topical treatment, spray-applied to wet concrete and floated or troweled into the surface.

#### **2.03 DENSIFIERS AND HARDENERS**

- A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
  - 1. Use at following locations: Exposed concrete slabs.
  - 2. Composition: Lithium silicate.
  - 3. Products:
    - a. SpecChem, LLC; SpecHard: [www.specchemllc.com/#sle](http://www.specchemllc.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.04 COATINGS**

- A. Low Gloss Clear Coating: Transparent, nonyellowing, water- or solvent-based coating.
  - 1. Use at following locations: Exposed concrete slabs.
  - 2. Composition: Acrylic polymer-based.
  - 3. Products:
    - a. SpecChem, LLC; SpecGuard: [www.specchemllc.com](http://www.specchemllc.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements. For compatibility, substitutions are to be or the complete system in lieu of individual products or

components.

4. Joint Filler and Crack Repair: As recommended by manufacturer.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that floor surfaces are acceptable to receive the work of this section.
  1. Comply with manufacturer's written instructions for acceptable surface temperature and moisture content.
  2. Verify that concrete has been cured a minimum of 28 days, to a strength of 3,500 psi minimum.
  3. Verify that the overall floor flatness/levelness meets the following minimum criteria: F(F) of 50; F(L) of 30.
  4. Verify that the entrapped air content of the concrete is 3 percent or less in accordance with ASTM C173/C173M.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

#### **3.02 GENERAL**

- A. Apply materials in accordance with manufacturer's instructions.
- B. Provide minimum 80 grit grind to remove chalk lines, fluorescent paint, construction marks and other defects at all areas to receive concrete coatings prior to application
- C. Apply materials in accordance with manufacturer's instructions.

#### **3.03 DENSIFIER AND HARDENER APPLICATION**

- A. Apply and scrub using mechanical scrubbers, and use materials, equipment, procedures, and coverage rates all as specified by manufacturer. Use manufacturer approved installer after concrete slab has cured for a minimum of 28 days and is completely dry.
- B. Application temperature to be above 40 degrees F.
- C. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, other impediments to adhesion.
- D. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- E. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove
- F. Protect finished surface as required and as recommended by manufacturer.

#### **3.04 COATING APPLICATION**

- A. Apply with damp microfiber pad and downward pressure and burnish with high-speed burnisher, and use materials, equipment, procedures and coverage rates all as specified by manufacturer. Use manufacturer approved installer a minimum of 2 to 3 days after application of densifier/hardener.
- B. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- C. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- D. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- E. Allow coatings to cure, and protect finished surface from water exposure per manufacturer's requirements.

- F. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

**END OF SECTION**

**SECTION 04 73 00  
MANUFACTURED STONE MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Mechanically attached lightweight synthetic stone veneer.
- B. Installation materials.
- C. Accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.
- B. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster 2023.
- C. ASTM C1780 - Standard Practice for Installation Methods for Cement-Cased Adhered Masonry Veneer 2020.
- D. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity 2015 (Reapproved 2020).
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- F. 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).
- G. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021.
- H. ASTM G155 - Standard Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials 2021.
- I. ICC-ES AC51 - Acceptance Criteria for Adhered Manufactured Stone Masonry Veneer 2018, with Editorial Revision (2021).
- J. ICC-ES AC90 - Acceptance Criteria for Fiber Cement Siding Used as Exterior Wall Siding 2020, with Editorial Revision.
- K. ICC-ES AC92 - Acceptance Criteria for Polymer-Based, Polymer-Modified and High-Pressure Laminate Exterior and Interior Wall Cladding 2013, with Editorial Revision (2021).
- L. ICC-ES AC235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies 2015, with Editorial Revision (2022).
- M. NCMA (AMSV) - Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer Current Edition, Including All Revisions.
- N. NCMA TEK 20-01 - Key Installation Checkpoints for Manufactured Stone Veneer 2014.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for AMSMV units, lightweight synthetic stone veneer, lath, rainscreen drainage material, and water-resistive barrier, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Color charts.
  - 4. Installation methods.

- C. Shop Drawings: Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on drawings.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 12 inches square, representing actual product, color, patterns and texture.
- F. Samples: Submit four samples of AMSMV units to illustrate color, texture, and extremes of color range.
- G. Evaluation Service Reports: Show compliance of GFRC lightweight synthetic stone veneer panels with specified requirements of ICC-ES AC90 and ICC-ES AC235.
- H. Evaluation Service Reports: Show compliance of polymer-based lightweight synthetic stone veneer with specified requirements of ICC-ES AC92.
- I. Manufacturer's Certificate: Certify that AMSMV units and mortar meet or exceed specified requirements.
- J. Manufacturer's Qualification Statement.
- K. Installer's Qualification Statement.
- L. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- M. Specimen Warranty.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum ten years of documented experience.
  - 1. Current producer member of the National Concrete Masonry Association.
- B. Installer Qualifications: Company specializing in performing work of type specified, with at least five years of documented experience.

#### **1.06 MOCK-UPS**

- A. Construct mock-up panel 8 feet long by 3'- 6" feet high; include AMSMV, lightweight synthetic stone veneer, accessories, substrate, and representative wall openings.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Prevent mechanical damage and contamination by other materials.
- C. Protect products from precipitation combined with freezing temperatures. Do not install products with visible frozen moisture.
- D. Protect Portland cement based materials from moisture and humidity. Store under cover off the ground in a dry location.

#### **1.08 FIELD CONDITIONS**

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

### 1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Provide 50 year manufacturer warranty for AMSMV.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Mechanically Attached Lightweight Synthetic Stone Veneer:
  - 1. Evolve Stone, Inc; \_\_\_\_\_: [www.evolvestone.com/#sle](http://www.evolvestone.com/#sle).

### 2.02 MECHANICALLY ATTACHED LIGHTWEIGHT SYNTHETIC STONE VENEER

- A. Individual cast masonry units using mixture of polymers, lightweight aggregates, and color pigments to replicate appearance of dry stacked natural stone and designed to be face nailed to backing surface or adhered to cementitious substrate.
  - 1. Style: Coursed ashlar: Capital Sky.
  - 2. Walls: Provide with blended color/texture:
    - a. Percent 33, Color: Morning Aspen.
    - b. Percent 66, Color: Kodiak Mine.
  - 3. Performance Criteria:
    - a. Comply with ICC-ES AC92 acceptance criteria.
    - b. Wind Load Testing: Comply with ASTM E330/E330M.
    - c. Accelerated Weathering: Tested in accordance with ASTM G155; 2,000 hours with no deleterious effects.
    - d. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 120 days exposure, when tested in accordance with ASTM D2247.
    - e. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.
    - f. Surface Burning Characteristics of Interior Fire-Rated Units: Flame spread index of 75 or less, and smoke developed index of 450 or less, Class B, when tested in accordance with ASTM E84.

### 2.03 ACCESSORIES

- A. Water-Resistive Barrier: See Section 07 25 00.
- B. Fasteners for Polymeric Synthetic Stones, Wood Framing: 16 gauge, 0.065 inch stainless steel finish nails; 2-1/2 inch, minimum, or length as required to penetrate through structural substrate, complying with ASTM F1667.
- C. Rainscreen Drainage Material:
  - 1. Drainage Mat: as required or recommended by manufacturer.
    - a. Thickness: 1/8 inch.
    - b. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
    - c. Seam Tape and Bug Screen: As recommended by rainscreen drainage mat manufacturer.
    - d. Manufacturers:
      - 1) Evolve Rainscreen.
- D. Cleaning Solution: Non-acidic, not harmful to AMSMV work or adjacent materials, approved by AMSMV manufacturer.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that backup wall system construction complies with AMSMV manufacturer's instructions, NCMA (AMSV), NCMA TEK 20-01, ASTM C1780 and ICC-ES AC51.
- 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 installation of AMSMV.

### **3.02 PREPARATION**

#### **3.03 INSTALLATION - WATER-RESISTIVE BARRIER**

- A. Where required by AMSMV manufacturer's instructions, NCMA (AMSV), NCMA TEK 20-01, ASTM C1780 or ICC-ES AC51, install 2 layers of water-resistive barrier in accordance with water-resistive barrier manufacturer's instructions. Integrate water-resistive barrier with all flashing accessories, adjacent water-resistive barriers, doors, windows, penetrations, and cladding transitions.

#### **3.04 INSTALLATION - RAINSCREEN DRAINAGE MATERIAL**

- A. Install rainscreen drainage material and metal lath with accessories over sheathing material and water-resistive barrier with fastening system in accordance with ASTM C1063 into wood or metal studs. Install drainage material with filter fabric mortar screen to exterior.

#### **3.05 INSTALLATION - MECHANICALLY ATTACHED LIGHTWEIGHT SYNTHETIC STONE VENEER**

- A. Install mechanically attached lightweight synthetic stone veneer in accordance with manufacturer's instructions, subject to conditions of ICC-ES Evaluation Report ESR-2859.
- B. Windows, Doors and Wall Openings: Butt lightweight synthetic stone veneer units to wall opening.
- C. Sills: Install sills where located on drawings.
- D. Caps: Install capstones where located on drawings.
- E. Seal joints at wall openings and penetrations with sealant approved for use with lightweight synthetic stone veneer.

#### **3.06 INSTALLATION - 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.
- B. Extend metal flashings through exterior face of AMSMV and terminate in an angled drip with hemmed edge.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

#### **3.07 CONTROL AND EXPANSION JOINTS**

- A. Form joints as detailed on drawings.

#### **3.08 CUTTING AND FITTING**

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

#### **3.09 CLEANING**

- A. Remove excess mortar and mortar smears as work progresses.
- B. Clean AMSMV in accordance with manufacturer's installation instructions.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.



**3.10 PROTECTION**

- A. Protect finished work from rain during and for 48 hours following installation.
- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**

**SECTION 05 12 00**  
**STRUCTURAL STEEL FRAMING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural steel framing members.
- B. Structural steel support members and struts.
- C. Base plates, shear stud connectors and expansion joint plates.
- D. Grouting under base plates.

**1.02 REFERENCE STANDARDS**

- A. AISC (MAN) - Steel Construction Manual 2023.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2022.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- E. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel 2013 (Reapproved 2018).
- 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 2021, with Editorial Revision.
- I. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2022.
- J. 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.
- K. ASTM F959/F959M - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series 2017a.
- L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- M. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- N. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).
- O. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.
- P. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections 2020.
- Q. SSPC-SP 3 - Power Tool Cleaning 2018.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
  - 2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Fabricator Test Reports: Comply with ASTM A1011/A1011M.

- E. 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.
- F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

#### **1.04 QUALITY ASSURANCE**

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. 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.
- C. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- D. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Rolled Steel Structural Shapes: ASTM A992/A992M.
- C. Steel Shapes, Plates, and Bars: ASTM A242/A242M high-strength, corrosion-resistant structural steel.
- D. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- E. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- F. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.
- G. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
- H. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436/F436M Type 1 washers.
- I. Headed Anchor Rods: ASTM A307 Grade C, plain.
- J. Load Indicator Washers: Provide washers complying with ASTM F959/F959M at connections requiring high-strength bolts.
- K. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- L. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
  - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- M. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- N. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

#### **2.02 FABRICATION**

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

### **2.03 FINISH**

- A. Prepare structural component surfaces in accordance with SSPC-SP 3.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

### **3.02 ERECTION**

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components and shear studs indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- F. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

### **3.03 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

### **3.04 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

**END OF SECTION**

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**SECTION 05 50 00  
METAL FABRICATIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Shop fabricated steel and aluminum items.
- B. Downspout boots.

**1.02 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.
- F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).
- I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- J. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- K. SSPC-SP 2 - Hand Tool Cleaning 2018.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

**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. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

**2.02 MATERIALS - ALUMINUM**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.

### **2.03 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. 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.

### **2.04 FABRICATED ITEMS**

#### **2.05 FINISHES - STEEL**

- A. Prime paint steel items.
  - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for \_\_\_\_\_ finish.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

#### **2.06 FABRICATION TOLERANCES**

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

#### **3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

#### **3.03 INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.

**END OF SECTION**

**SECTION 05 51 33  
METAL LADDERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Prefabricated ship ladders.

**1.02 REFERENCE STANDARDS**

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements 2008 (Reaffirmed 2018).

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:

**PART 2 PRODUCTS**

**2.01 PREFABRICATED LADDERS**

- A. Prefabricated Ship Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
  - 1. Components: Manufacturer's standard rails, rungs, treads, handrails, returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
  - 2. Incline: 60 degrees.
  - 3. Finish: Manufacturer's standard clear anodized coating, comply with AAMA 611, Class 1.
  - 4. Manufacturers:
    - a. Basis of Design: Alaco Ladder Company; HP75 - 75 degree folding ships ladder with hatch compatible handrails: [www.alacoladder.com](http://www.alacoladder.com)
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

**3.02 INSTALLATION**

- A. Install compliant to manufacturer's requirements and recommendations.
- B. Install items plumb and level, accurately fitted, free from distortion or defects.
- C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.

**END OF SECTION**



**SECTION 06 10 00  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural dimension lumber framing.
- B. Exposed timber structural framing.
- C. Nonstructural dimension lumber framing.
- D. Rough opening framing for doors, windows, and roof openings.
- E. Sheathing.
- F. Roof-mounted curbs.
- G. Roofing nailers.
- H. Preservative treated wood materials.
- I. Fire retardant treated wood materials.
- J. Miscellaneous framing and sheathing.
- K. Communications and electrical room mounting boards.
- L. Concealed wood blocking, nailers, and supports.
- M. Miscellaneous wood nailers, furring, and grounds.
- N. Roof sheathing with factory applied roofing underlayment.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 15 00 - Wood Decking.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2023a.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- E. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings 2018, with Errata (2019).
- F. AWPA U1 - Use Category System: User Specification for Treated Wood 2023.
- G. PS 1 - Structural Plywood 2019.
- H. PS 2 - Performance Standard for Wood Structural Panels 2018.
- I. PS 20 - American Softwood Lumber Standard 2021.
- J. WWPA G-5 - Western Lumber Grading Rules 2021.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, 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.

### **1.05 QUALITY ASSURANCE**

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP);  
[www.airbarrier.org/#sle](http://www.airbarrier.org/#sle):

### **1.06 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: Douglas Fir-Larch, 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](http://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. Grading Agency: Western Wood Products Association; WWPA G-5.
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Stud Framing (2 by 2 through 2 by 6 ):
1. Species: as indicated.
  2. Grade: as indicated.
- D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 ):
1. Species and Grades: As indicated on drawings for various locations.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
  2. Boards: Standard or No. 3.

### **2.03 EXPOSED DIMENSION LUMBER**

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Grading Agency: Western Wood Products Association; WWPA G-5.
- C. Sizes: Nominal sizes as indicated on drawings.
- D. Surfacing: S4S.
- E. Moisture Content: S-dry or MC19.
- F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 ):
1. Species and Grades: As indicated on drawings for various locations.

### **2.04 TIMBERS FOR CONCEALED APPLICATIONS**

- A. Grading Agency: Western Wood Products Association; WWPA G-5.

- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry (23 percent maximum).
- D. Beams and Posts 5 inches and over in thickness:
  - 1. Species: as indicated.
  - 2. Grade: as indicated.

#### **2.05 EXPOSED TIMBERS**

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (20 percent maximum).
- C. Surfacing: S4S.
- D. Species: as indicated.
- E. Grade: as indicated
- F. Grade: Clear Heart Structural.

#### **2.06 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: as indicated.
- E. Grade: As indicated

#### **2.07 CONSTRUCTION PANELS**

- A. Roof Sheathing: PS 2 type, rated Structural I Sheathing.
  - 1. Bond Classification: Exterior.
  - 2. Span Rating: 60.
  - 3. Performance Category: 5/8 PERF CAT.
- B. Roof Sheathing: Oriented strand board wood structural panel; PS 2.
  - 1. Grade: Structural 1 Sheathing.
  - 2. Bond Classification: Exposure 1.
  - 3. Performance Category: 5/8 PERF CAT.
  - 4. Span Rating: 40/20.
  - 5. Edges: Square.
  - 6. Exposure Time: Sheathing will not delaminate or require sanding due to moisture absorption from exposure to weather for up to 500 days.
- C. Roof Sheathing: Wood construction panel laminated to insulation board.
  - 1. Construction Panel: 7/16 inch (11 mm) oriented strand board (OSB).
  - 2. Insulation Board: Polyisocyanurate foam plastic with cellulosic felt facer or glass fiber mat facer on major surface opposite construction panel.
  - 3. Finished Panel: Comply with ASTM C1289, Type V.
  - 4. Manufacturers:
    - a. Hunter Panels: [www.hunterpanels.com/#sle](http://www.hunterpanels.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Wall Sheathing: PS 2 type.
  - 1. Bond Classification: Exposure 1.
  - 2. Grade: Structural I Sheathing.
  - 3. Span Rating: 24.
  - 4. Performance Category: 5/16 PERF CAT.

5. Edge Profile: Square edge.

- E. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## 2.08 ACCESSORIES

- A. Fasteners and Anchors:
1. As indicated by structural documents.
  2. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
- C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- D. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
1. Manufacturers:
    - a. As indicated by structural documents
    - b. Where not indicated elsewhere: Franklin International, Inc; Titebond Fast Set Polyurethane Construction Adhesive: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. General Purpose Construction Adhesives:
1. Manufacturers:
    - a. ADFAST Corporation; ADBOND EX 5690: [www.adfastcorp.com/#sle](http://www.adfastcorp.com/#sle).

## 2.09 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
  2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber exposed to weather.
    - c. Treat lumber in contact with roofing, flashing, or waterproofing.
    - d. Treat lumber in contact with masonry or concrete.
    - e. Treat lumber in other locations as indicated.
  2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
    - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
    - b. Treat plywood in contact with masonry or concrete.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- B. Coordinate installation of rough carpentry members specified in other sections.

### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 FRAMING INSTALLATION**

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by .
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

### **3.04 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In 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.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Provide the following specific nonstructural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Wall paneling and trim.
  - 9. Joints of rigid wall coverings that occur between studs.
  - 10. other as indicated.

### **3.05 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

### **3.06 INSTALLATION OF CONSTRUCTION PANELS**

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
  - 1. Nail panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.
  - 4. Size and Location: As indicated on drawings.

### **3.07 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

### **3.08 TOLERANCES**

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

### **3.09 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

### **3.10 CLEANING**

- A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
  - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- 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.

**END OF SECTION**

**SECTION 06 15 00  
WOOD DECKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Softwood lumber structural wood decking.

**1.02 REFERENCE STANDARDS**

- A. AITC 111 - Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection 2005.
- B. SPIB (GR) - Standard Grading Rules 2021.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.
- C. Shop Drawings: Indicate deck framing system, loads and cambers, bearing details, and framed openings.
- D. Samples of Wood Deck Exposed To View: Submit two samples, 6" by 6" inch in size illustrating wood grain, stain, and finish.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least three years of documented experience and certified by AITC.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect glue laminated members in accordance with AITC 111 requirements for unwrapped material.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

**2.02 WOOD MATERIALS**

- A. Wood fabricated from old growth timber is not permitted.
- B. Lumber Decking: Fabricated to AITC 112.
  - 1. Species: as indicated, graded under SPIB (GR) rules as AITC Select quality.
  - 2. Size: as indicated, nominal.

**2.03 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Fastener Type and Finish: Hot-dipped galvanized steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that support framing is ready to receive decking.

**3.02 PREPARATION**

- A. Coordinate placement of bearing items.

**3.03 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

**3.04 INSTALLATION - BOARD DECKING**

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.
- B. Fit butt end deck joints occurring between support members with metal splines to maintain tight, aligned joints.
- C. Engage decking tongue and groove edges.
- D. Secure with fasteners. Side spike planks together, through pre-drilled holes.

**END OF SECTION**



**SECTION 06 17 33  
WOOD I-JOISTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wood I-joists for roof framing.
- B. Bridging, bracing, and anchorage.
- C. Framing for openings.
- D. Preservative treatment of wood.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Material requirements for blocking, plates, and miscellaneous framing.

**1.03 REFERENCE STANDARDS**

- A. PS 2 - Performance Standard for Wood Structural Panels 2018.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's literature describing materials, dimensions, allowable spans and spacings, bearing and anchor details, bridging and bracing requirements, and installation instructions; identify independent inspection agency.
- C. Shop Drawings: Indicate sizes and spacing of joists, bracing and bridging, bearing stiffeners, holes to be cut (if any), and framed openings between joists.
- D. Certificate: Certification by joist manufacturer that products delivered are of the same design and construction as those evaluated by the independent inspection agency.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in manufacturer's original packaging with manufacturer's name and product identification intact and legible.
- B. Protect products from damage due to weather and breakage.
- C. Protect joists from warping or other distortion by stacking in upright position, braced to resist movement, with air circulation under coverings and around stacks.
- D. Handle individual joists in the upright position.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Wood I-Joists:
  - 1. RedBuilt LLC: [www.redbuilt.com/#sle](http://www.redbuilt.com/#sle).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Wood I-Joists: Solid lumber top and bottom flanges and oriented strand board (OSB) webs bonded together with structural adhesive, with published span rating to meet project requirements.
  - 1. Span Rating: Established and monitored in accordance with ASTM D5055 by independent inspection agency.
  - 2. Oriented Strand Board: Comply with PS 2.

3. Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.
  4. Fabrication Tolerances:
    - a. Flange Width: Plus/minus 1/32 inch.
    - b. Flange Thickness: Minus 1/16 inch.
    - c. Joist Depth: Plus 0, minus 1/8 inch.
  5. Marking: Mark each piece with depth, joist spacing, and allowable span for joist spacing.
- B. Wood-Based Components:
1. Wood fabricated from old growth timber is not permitted.
- C. Joist Bridging: Type, size and spacing recommended by joist manufacturer.
- D. Wood Blocking, Plates, and Miscellaneous Framing: As specified in Section 06 10 00.
- E. Fasteners: Electrogalvanized steel, type to suit application.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that supports and openings are ready to receive joists.

#### **3.02 PREPARATION**

- A. Coordinate placement of bearing items.

#### **3.03 ERECTION**

- A. Install joists in accordance with manufacturer's instructions.
- B. Set structural members level and plumb, in correct position.
- C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing.
- D. Install permanent bridging and bracing.
- E. Install headers and supports to frame openings required.
- F. Coordinate installation of sheathing/decking with work of this section.

#### **3.04 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment in accordance with manufacturer's instructions.

**END OF SECTION**

**SECTION 06 18 00  
GLUED-LAMINATED CONSTRUCTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Glue laminated wood beams.
- B. Steel hardware and attachment brackets.

**1.02 REFERENCE STANDARDS**

- A. AITC A190.1 - American National Standard for Wood Products - Structural Glued Laminated Timber 2007.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- C. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions 2012a (Reapproved 2018).
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).
- E. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials, application technique and resultant performance information.
- C. Shop Drawings: Indicate framing system, sizes and spacing of members, loads and cambers, bearing and anchor details, bridging and bracing, framed openings .

**1.04 QUALITY ASSURANCE**

- A. Manufacturer/Fabricator Qualifications: Company specializing in manufacture of glue laminated structural units with three years of documented experience, and certified by AITC in accordance with AITC A190.1.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect members to AITC requirements for not wrapped.

**PART 2 PRODUCTS**

**2.01 GLUED-LAMINATED UNITS**

- A. Glued-Laminated Units: Fabricate in accordance with AITC 117 Industrial grade.
  - 1. Verify dimensions and site conditions prior to fabrication.
  - 2. Cut and fit members accurately to length to achieve tight joint fit.
  - 3. Fabricate member with camber built in.
  - 4. Do not splice or join members in locations other than those indicated without permission.
  - 5. After end trimming, seal with penetrating sealer in accordance with AITC requirements.

**2.02 MATERIALS**

- A. Lumber: Softwood lumber complying with RIS (GR) grading rules with 12 percent maximum moisture content before fabrication. See structural drawings for additional requirements.
- B. Steel Connections and Brackets: ASTM A36/A36M weldable quality, prime paint except where embedded in concrete.
- C. Laminating Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.

**2.03 WOOD TREATMENT**

- A. Factory-Treated Lumber: Comply with requirements of AWWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.

## **2.04 FABRICATION**

- A. Fabricate glue laminated structural members in accordance with AITC Industrial grade.
- B. Welding: Perform welding in accordance with AWS D1.1/D1.1M.
- C. Verify dimensions and site conditions prior to fabrication.
- D. Cut and fit members accurately to length to achieve tight joint fit.
- E. Fabricate member with camber built in.
- F. Do not splice or join members in locations other than those indicated without permission.
- G. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.
- H. After end trimming, seal with penetrating sealer in accordance with AITC requirements.
- I. Field Finishing of Members: Specified in Section 09 91 13 and 09 91 23.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that supports are ready to receive units.
- B. Verify sufficient end bearing area.

### **3.02 PREPARATION**

- A. Coordinate placement of bearing items.

### **3.03 ERECTION**

- A. Lift members using protective straps to prevent visible damage.
- B. Set structural members level and plumb, in correct positions or sloped where indicated.
- C. Provide temporary bracing and anchorage to hold members in place until permanently secured.
- D. Fit members together accurately without trimming, cutting, splicing, or other unauthorized modification.
- E. Swab and seal the interior wood surfaces of field drilled holes in members with primer.
- F. Field Finishing: Specified in Section 09 91 13 and 09 91 23.

### **3.04 TOLERANCES**

- A. Framing Members: 1/2 inch maximum from true position.

**END OF SECTION**

**SECTION 06 20 00  
FINISH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Finish carpentry items.
- B. Wood casings and moldings.
- C. Hardware and attachment accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- B. AWI (QCP) - Quality Certification Program Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood 2023.
- F. BHMA A156.9 - Cabinet Hardware 2020.
- G. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.
- H. PS 1 - Structural Plywood 2019.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data:
  - 1. Provide data on fire retardant treatment materials and application instructions.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
  - 2. Include certification program label.

**1.04 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five 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.
- B. Quality Certification:
  - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: [www.awiqcp.org/#sle](http://www.awiqcp.org/#sle).
  - 2. Provide labels or certificates indicating that 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 certification program.
  - 4. Provide designated labels on installed products as required by certification program.
  - 5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- B. Protect from moisture damage.
- C. Handle materials and products to prevent damage to edges, ends, or surfaces.

## **PART 2 PRODUCTS**

### **2.01 FINISH CARPENTRY ITEMS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- C. Interior Woodwork Items:
  - 1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
  - 2. Wood Trim: Clear Fir; prepared for Stain and Transparent Finish as indicated.

### **2.02 LUMBER MATERIALS**

- A. Softwood Lumber: Douglas Fir Larch species, smooth sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

### **2.03 SHEET MATERIALS**

- A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, veneer core; PS 1 Grade A-B, glue type as recommended for application.
- C. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1 Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

### **2.04 FASTENINGS**

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Fasteners: Of size and type to suit application. Steel finish in concealed locations and Recessed Steel with matching wood putty finish in exposed locations.
- C. Fasteners for Exterior Applications: Stainless steel; length required to penetrate wood substrate 1-1/2 inch minimum.
- D. Concealed Joint Fasteners: Threaded steel.

### **2.05 ACCESSORIES**

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Lumber for Shimming and Blocking: Softwood lumber of Doug Fir species.
- C. Primer: Alkyd primer sealer.
- D. Wood Filler: Solvent base, tinted to match surface finish color.

### **2.06 HARDWARE**

- A. Hardware: Comply with BHMA A156.9.
- B. Countertop Support Brackets: Fixed, L-shaped, corner reinforced, face-of-stud mounting.
  - 1. Material: Steel.
    - a. Finish: Manufacturer's standard, factory-applied, textured powder coat.
    - b. Color: Black.
    - c. Height: 5 inches.
    - d. Support Length: 8 inches.
  - 2. Products:
    - a. A&M Hardware, Inc; Standard Brackets: [www.aandmhardware.com/#sle](http://www.aandmhardware.com/#sle).
- C. Vanity Brackets: Fixed, ADA-Compliant, face-of-stud mounting.

1. Material: Steel; formed compound shapes.
  - a. Finish: Manufacturer's standard, factory-applied, powder coat.
  - b. Color: Black.
2. Height: 18 inches.
3. Support Length: 21-1/2 inches.
4. Products:
  - a. A&M Hardware, Inc; ADA Vanity Brackets: [www.aandmhardware.com/#sle](http://www.aandmhardware.com/#sle).
  - b. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.07 WOOD TREATMENT**

- A. Factory-Treated Lumber: Comply with requirements of AWWA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- C. Wood Preservative by Pressure Treatment (PT Type): Provide AWWA U1 treatment using waterborne preservative with 0.25 percent retainage.
- D. Provide identification on fire retardant treated material.
- E. Redry wood after pressure treatment to recommended moisture content.

## **2.08 SITE FINISHING MATERIALS**

- A. Stain, Shellac, Varnish, and Finishing Materials: Comply with AWI/AWMA/WI (AWS) or AWMA/WI (NAAWS), unless noted otherwise.

## **2.09 FABRICATION**

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

## **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/AWMA/WI (AWS) or AWMA/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.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

### **3.02 INSTALLATION**

- A. Install custom fabrications in accordance with AWI/AWMA/WI (AWS) or AWMA/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.

- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install components with nails at 16 inch on center.

**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 91 13 and 09 91 23.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

**3.04 TOLERANCES**

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**



**SECTION 06 83 16  
FIBERGLASS REINFORCED PANELING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiberglass reinforced plastic panels.
- B. Trim.

**1.02 REFERENCE STANDARDS**

- A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation current edition.
- B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2023, with Editorial Revision.
- C. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor 2013a.
- D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- E. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels 2022.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- G. ISO 2812-1 - Paints and Varnishes -- Determination of Resistance to Liquids -- Part 1: Immersion in Liquids Other than Water 2017.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two samples 6 by 6 inch in size illustrating material and surface design of panels.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fiberglass Reinforced Plastic Panels:
  - 1. Crane Composites, Inc: [www.cranecomposites.com/#sle](http://www.cranecomposites.com/#sle).
  - 2. Marlite, Inc: [www.marlite.com/#sle](http://www.marlite.com/#sle).
  - 3. Substitutions: See Section 01 6000 - Product Requirements.

**2.02 PANEL SYSTEMS**

- A. Wall Panels:
  - 1. Panel Size: 4 by 8 feet.
  - 2. Panel Thickness: 0.075 inch.
  - 3. Surface Design: Smooth.
  - 4. Color: As selected by Architect.
  - 5. Attachment Method: Adhesive only, with trim and sealant in joints.

**2.03 MATERIALS**

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.

1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
  4. Impact Strength: Greater than 6 ft lb force per inch, when tested in accordance with ASTM D256.
  5. Sanitation and Cleanability: Comply with 9 CFR 416.2.
  6. Chemical Cleanability: Excellent chemical resistance to common cleaners and detergents when tested in accordance with ISO 2812-1.
- B. Trim: Aluminum; color coordinating with panel.
- C. Adhesive: Type recommended by panel manufacturer.
- D. Sealant: Type recommended by panel manufacturer; color matching panel.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

#### **3.02 INSTALLATION - WALLS**

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

**END OF SECTION**

**SECTION 07 21 00  
THERMAL INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Board insulation and integral vapor retarder at over roof sheathing and exterior wall behind \_\_\_\_\_ wall finish.
- B. Batt insulation in exterior wall, ceiling, and roof construction.
- C. Batt insulation hanging assembly at underside of roof deck.
- D. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.
- B. Section 07 25 00 - Weather Barriers: Separate air barrier and vapor retarder materials.

**1.03 REFERENCE STANDARDS**

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2023.
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2023a.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- E. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Include information on installation techniques.
- F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- G. 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](http://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.
- B. Do not install batt insulation until building is watertight. Remove all batt insulation that gets wet after installation. Do not install batt insulation in conditions outside of the manufacturers written recommendations.

## PART 2 PRODUCTS

### 2.01 APPLICATIONS

- A. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.
- B. Insulation in Wood Framed Ceiling Structure: Batt insulation with separate vapor retarder.
- C. Insulation at underside of Wood Roof Deck: Batt insulation with integral vapor barrier.
- D. Insulation Over Roof Deck: Polyisocyanurate board.

### 2.02 FOAM BOARD INSULATION MATERIALS

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
  - 1. Classifications:
    - a. Type V: Faced with oriented strand board (OSB) or plywood on one major surface of core foam and glass fiber reinforced cellulosic felt or uncoated or coated polymer-bonded glass fiber mat facer on other major surface of core foam.
      - 1) Compressive Strength: 16 psi, minimum.
      - 2) Thermal Resistance, R-value: At 2 inch thick; 10 Min. at 75 degrees F.
  - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  - 4. Water Vapor Permeance: 1.2 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96/E96M, desiccant method.
  - 5. Board Size: 48 inch by 96 inch.
  - 6. Board Thickness: 2.0 inch.
  - 7. Board Edges: Square.
  - 8. Products:
    - a. Atlas Roofing Corporation; ACFoam-II Polyiso Roof Insulation: [www.atlasroofing.com/#sle](http://www.atlasroofing.com/#sle).
    - b. Carlisle Coatings & Waterproofing, Inc; R2+ Matte: [www.carlisleccw.com/#sle](http://www.carlisleccw.com/#sle).
    - c. GAF; EnergyGuard Polyiso Insulation: [www.gaf.com/#sle](http://www.gaf.com/#sle).
    - d. Johns Manville; AP Foil-Faced: [www.jm.com/#sle](http://www.jm.com/#sle).
    - e. Rmax Inc; ECOMAXci FR: [www.rmax.com/#sle](http://www.rmax.com/#sle).
    - f. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.03 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
  - 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. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
  - 4. Formaldehyde Content: Zero.
  - 5. Thermal Resistance as indicated in drawings WSEC summary data.
  - 6. Facing: Unfaced.
  - 7. Products:
    - a. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).

- b. Johns Manville: [www.jm.com/#sle](http://www.jm.com/#sle).
  - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
- 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
  - 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
  - 3. Provide foil facing on one side, at locations indicated on drawings.
  - 4. Products:
    - a. Johns Manville; MinWool Sound Attenuation Fire Batts: [www.jm.com/#sle](http://www.jm.com/#sle).
    - b. Knauf Insulation; EcoBatt Insulation: [www.knaufinsulation.com/#sle](http://www.knaufinsulation.com/#sle).
    - c. ROCKWOOL (ROXUL, Inc); COMFORTBATT: [www.rockwool.com/#sle](http://www.rockwool.com/#sle).
    - d. ROCKWOOL (ROXUL, Inc); AFB: [www.rockwool.com/#sle](http://www.rockwool.com/#sle).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.04 ACCESSORIES

- A. Interior Vapor Retarder: Modified polyethylene/polyacrylate (PE/PA) film reinforced with polyethylene terephthalate (PET) fibers, 12 mils, 0.012 inch thick.
- B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
- 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
  - 2. Width: As required for application.
  - 3. Temperature Resistance: Minus 40 degrees F to 212 degrees F
  - 4. Products: \_\_\_\_\_ manufactured by Siga-Majorex.
- C. Flashing Tape: Special reinforced film with high performance adhesive.
- 1. Application: Window and door opening flashing tape.
  - 2. Width: As required for application.
  - 3. Primer: Tape manufacturer's recommended product.
  - 4. Products:
    - a. Protecto Wrap Company; Protecto BT25XL: [www.protectowrap.com/#sle](http://www.protectowrap.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
- E. Wire Mesh: Galvanized steel, hexagonal wire mesh.
- F. Adhesive: Type recommended by insulation manufacturer for application.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### 3.02 BOARD INSTALLATION OVER STEEP SLOPE ROOF SHEATHING OR ROOF STRUCTURE

- A. Installation of board insulation over steep slope roof structure or roof sheathing, see Section 06 10 00.

### 3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior and interior assemblies as indicated in drawings continuous in 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.
- E. Retain otherwise unrestrained horizontal insulation batts in place with wire mesh secured to framing members.
- F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- G. Tape seal tears or cuts in vapor retarder.
- H. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.
- I. Coordinate work of this section with requirements for vapor retarder, see Section 07 25 00.
- J. Coordinate work of this section with construction of air barrier seal, see Section 07 25 00.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:
  - 1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
  - 2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
  - 3. Cooperate with ABAA testing agency.
  - 4. Allow access to air barrier work areas and staging.
  - 5. Do not cover air barrier work until tested, inspected, and accepted.

#### **3.05 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

**SECTION 07 21 19  
FOAMED-IN-PLACE INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Foamed-in-place insulation.
  - 1. In exterior wall voids, cracks and crevices.
  - 2. At junctions of dissimilar wall and roof materials.

**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 D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics 2019.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection as required by ABAA QAP.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.
- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- F. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience.
- C. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); [www.airbarrier.org/#sle](http://www.airbarrier.org/#sle):
  - 1. Installer Qualification: Use accredited contractor, 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.

**1.05 FIELD CONDITIONS**

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.
- B. Do not apply foam when temperature is within 5 degrees F of dew point.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Foamed-In-Place Insulation:
  - 1. BASF Corporation; WALLTITE US Series Closed Cell: [www.spf.basf.com/#sle](http://www.spf.basf.com/#sle).
  - 2. Carlisle Spray Foam Insulation: [www.carlislesfi.com/#sle](http://www.carlislesfi.com/#sle).
  - 3. Gaco Western: [www.gaco.com/#sle](http://www.gaco.com/#sle).
  - 4. Henry Company: [www.henry.com/#sle](http://www.henry.com/#sle).
  - 5. Johns Manville; JM Corbond III Closed Cell Spray Polyurethane Foam: [www.jm.com/#sle](http://www.jm.com/#sle).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 MATERIALS**

- A. Foamed-In-Place Insulation: Low-density, flexible, open or closed cell, water vapor permeable polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
  - 1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and overcoat limitations.
  - 2. Thermal Resistance: R-value of 3.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
  - 3. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
  - 4. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
  - 5. Basis of Design:
    - a. Carlisle Spray Foam Insulation; SealTite Pro Open Cell: [www.carlislesfi.com/#sle](http://www.carlislesfi.com/#sle).
  - 6. Other Acceptable Manufacturers:
    - a. BASF Corporation; ENERTITE NM: [www.spf.basf.com/#sle](http://www.spf.basf.com/#sle).
    - b. Carlisle Spray Foam Insulation; SealTite Pro High Yield: [www.carlislesfi.com/#sle](http://www.carlislesfi.com/#sle).
    - c. Gaco Western; Gaco 052N: [www.gaco.com/#sle](http://www.gaco.com/#sle).
    - d. Henry Company; \_\_\_\_\_: [www.henry.com/#sle](http://www.henry.com/#sle).
    - e. Icynene-Lapolla; Lapolla Foam-Lok 500: [www.icynene.com/#sle](http://www.icynene.com/#sle).
    - f. Johns Manville; JM ocSPF Open Cell Spray Polyurethane Foam: [www.jm.com/#sle](http://www.jm.com/#sle).
- B. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
  - 1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and overcoat limitations.
  - 2. Thermal Resistance: R-value of 5.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
  - 3. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
  - 4. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
  - 5. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
  - 6. Closed Cell Content: At least 90 percent.
  - 7. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

### **2.03 ACCESSORIES**

- A. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify work within construction spaces or crevices is complete prior to insulation application.



- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

**3.02 PREPARATION**

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

**3.03 APPLICATION**

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to a uniform monolithic density without voids.
- C. Patch damaged areas.
- D. Trim excess away for applied trim or remove as required for continuous sealant bead.

**END OF SECTION**

**SECTION 07 25 00  
WEATHER BARRIERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water-resistive barriers.

**1.02 RELATED REQUIREMENTS**

**1.03 DEFINITIONS**

- A. Weather Barriers: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Water-Resistive Barrier: A material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

**1.04 REFERENCE STANDARDS**

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- D. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. Shop Drawings: Provide drawings of special joint conditions.
- D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

**1.06 MOCK-UPS**

- A. Construct weather barrier mock-up, 4 feet long by 8 feet wide, indicating sample of assemblies.
- B. Mock-up may remain as part of work.

**1.07 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

**PART 2 PRODUCTS**

**2.01 WEATHER BARRIER ASSEMBLIES**

- A. Interior Vapor Retarder:
  - 1. On inside face of studs of exterior walls, under cladding, use mechanically fastened vapor retarder sheet.

**2.02 WATER-RESISTIVE BARRIER MATERIALS**

- A. Water-Resistive and Air Barrier, Multilayers: Outer layers of nonwoven, spunbonded polypropylene with vapor permeable, watertight polymeric middle layer.
  - 1. Air Permeance: 0.0011 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
  - 2. Water Vapor Permeance: 54 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.

3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 3 months of weather exposure.
4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
5. Seam and Perimeter Tape: As recommended by sheet manufacturer.

### **2.03 ACCESSORIES**

- A. Sealants, Tapes, and Accessories Used for Sealing Water-Resistive Barrier and Adjacent Substrates: As indicated or complying with water-resistive barrier manufacturer's installation instructions.
- B. 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 nominal thickness.
- C. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
  1. Width: 4 inches.
  2. Products:
    - a. DuPont de Nemours, Inc; StraightFlash: [www.dupont.com/building/#sle](http://www.dupont.com/building/#sle).
    - b. Henry Company; FortiFlash Butyl: [www.henry.com/#sle](http://www.henry.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Liquid Flashing: One part, fast curing, nonsag, elastomeric, gun grade, trowelable liquid flashing.
  1. Products:
    - a. VaproShield, LLC; Liqui-Flash: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
- E. Stainless Steel Flashing: Self adhering flexible flashing with stainless steel face and a siliconized release liner.
  1. Products:
    - a. VaproShield, LLC: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).

## **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.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

### **3.03 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions, requirements and recommendations.
- B. Water-Resistive Barriers: Install continuous water-resistive barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.
- C. Mechanically Fastened Exterior Sheets:
  1. Install sheets shingle-fashion to shed water, with seams aligned horizontal.
  2. Overlap seams as recommended by manufacturer, 6 inches, minimum.
  3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches, minimum.
  4. Install water-resistive barrier over jamb flashings.
  5. Install head flashings under water-resistive barrier.

6. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.
- D. Openings and Penetrations in Exterior Water-Resistive Barriers:
1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches onto water-resistive barrier and at least 6 inches 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 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 wide, and covering entire depth of framing.
  4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches 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 01 40 00 - 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.
- C. Do not cover installed water-resistive barriers until required inspections have been completed.

#### **3.05 PROTECTION**

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

**END OF SECTION**

**SECTION 07 27 00  
AIR BARRIERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air barriers.

**1.02 DEFINITIONS**

- A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

**1.03 REFERENCE STANDARDS**

- A. AATCC Test Method 127 - Test Method for Water Resistance: Hydrostatic Pressure 2018, with Editorial Revision (2019).
- B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-- Tension 2016 (Reapproved 2021).
- C. ASTM D751 - Standard Test Methods for Coated Fabrics 2019.
- D. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds 1998 (Reapproved 2017).
- E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- H. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.
- I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on material characteristics, performance criteria, and limitations.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- E. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification; keep copies of each contractor accreditation and installer certification on site during and after installation, and present on-site documentation upon request.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Testing agency qualification statement.

**1.05 QUALITY ASSURANCE**

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); [www.airbarrier.org/#sle](http://www.airbarrier.org/#sle):

1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
- B. Air Barrier Association of America (ABAA) Evaluated Air Barrier Assemblies; [www.airbarrier.org/#sle](http://www.airbarrier.org/#sle): Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.
- D. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.
- E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

#### **1.06 MOCK-UPS**

- A. Construct air barrier mock-up, 8 feet long by 4 feet wide, indicating sample of all basic assembly detail conditions.
- B. Locate where directed.
- C. Mock-up may remain as part of work.

#### **1.07 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

### **PART 2 PRODUCTS**

#### **2.01 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR PERMEABLE)**

- A. Air Barrier Sheet, Mechanically Fastened:
  1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
  2. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
  3. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for at least 5 hours, when tested in accordance with AATCC Test Method 127.
  4. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
  5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, Class A, when tested in accordance with ASTM E84.
  6. Comply with NFPA 285 requirements for wall assembly.
  7. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2-1/2 inches wide, compatible with sheet material; unless otherwise indicated.
  8. Products:
    - a. Henry Company; WeatherSmart Commercial: [www.henry.com/#sle](http://www.henry.com/#sle).
    - b. SIGA Cover Inc; SIGA-Majvest 200: [www.siga.swiss/global\\_en/#sle](http://www.siga.swiss/global_en/#sle).
    - c. VaproShield, LLC; WrapShield IT - Integrated Tape: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
    - d. VaproShield, LLC; RevealShield IT - Integrated Tape: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Air Barrier Sheet, Self-Adhered:
  1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
  2. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
  3. Water Penetration Resistance Around Nails: Pass, when tested in accordance with ASTM D1970/D1970M (modified).

4. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
  5. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
  6. Seam and Perimeter Tape: As recommended by sheet manufacturer.
  7. Products:
    - a. Henry Company; Blueskin VP160: [www.henry.com/#sle](http://www.henry.com/#sle).
    - b. SIGA Cover Inc; SIGA-Majvest 500 SA: [www.siga.swiss/global\\_en/#sle](http://www.siga.swiss/global_en/#sle).
    - c. VaproShield, LLC; WrapShield SA - Self-Adhered: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
    - d. VaproShield, LLC; RevealShield SA - Self-Adhered: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
    - e. VaproShield, LLC; RainScreen SA - Self-Adhered: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
    - f. VaproShield, LLC; PanelShield SA - Self-Adhered: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
    - g. VaproShield, LLC; BlockShield SA - Self-Adhered: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
    - h. W. R. Meadows, Inc; Air-Shield SMP: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - i. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Air Barrier, Fluid Applied: Vapor semi-permeable, elastomeric waterproofing.
1. Air Barrier Coating:
    - a. Material: 100 percent silicone.
    - b. Dry Film Thickness (DFT): 20 mil, 0.020 inch, minimum.
    - c. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
    - d. Water Vapor Permeance: 11 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure B - Water Method, at 73.4 degrees F.
    - e. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
    - f. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
    - g. Comply with NFPA 285 requirements for wall assembly.
    - h. Nail Sealability: Pass, when tested in accordance with ASTM D1970/D1970M.
    - i. VOC Content: Zero.
    - j. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
    - k. Products:
      - 1) Henry Company; Air-Bloc All Weather STPE: [www.henry.com/#sle](http://www.henry.com/#sle).
      - 2) Pecora Corporation; Pecora XL-Perm Ultra VP with XL-Flash Liquid Flashing and Joint Filler, AVB Silicone Surface Transitions, and XL-Span Transition Membrane: [www.pecora.com/#sle](http://www.pecora.com/#sle).
      - 3) Soprema, Inc; SOPRASEAL Stick 1100T: [www.soprema.us/#sle](http://www.soprema.us/#sle).
      - 4) W.R. Meadows, Inc; Air-Shield TMP: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
      - 5) Substitutions: See Section 01 60 00 - Product Requirements.

## 2.02 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.
- B. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrate and air barrier materials.
  1. Application: Apply at 30 to 40 mil, 0.030 to 0.040 inch, nominal thickness.
  2. Color: Green.
  3. Elongation: 1,300 percent, measured in accordance with ASTM D412.
  4. Peel Adhesion: 28 lb/inch, minimum, when tested in accordance with ASTM D903.
  5. Hydrostatic Head Pressure: Resists head pressure of 57 feet, maximum, when tested in accordance with ASTM D751.
  6. Comply with NFPA 285 requirements for wall assembly.

- C. Primer: Liquid applied polymer.
  - 1. Color: Green.
  - 2. Elongation: 1,300 percent, measured in accordance with ASTM D412.
  - 3. Products:
- D. Foil-Faced Self-Adhering Flashing: Membrane consisting of cross-laminated high-density polyethylene facer laminated to ultraviolet (UV) and weather-resistant exterior aluminum foil facer, using nonasphaltic, butyl-based adhesive to self-adhere to substrate.
  - 1. Thickness: 45 mil, 0.045 inch, minimum.
  - 2. Roll Size: 50 feet long by 4 inches wide.
  - 3. Color: Silver aluminum.
  - 4. Tensile Strength: 400 psi, minimum, complying with ASTM D412.
  - 5. Products:
    - a. Pecora Corporation; Pecora XL-Wrap TWF - Thru Wall Flashing: [www.pecora.com/#sle](http://www.pecora.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
  - 1. Width: full width of wall frame member inches.
  - 2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.
- F. Stainless Steel Flashing: Flexible flashing with 2 mil, 0.002 inch thick Type 304 stainless steel sheet, 8 mil, 0.008 inch of butyl adhesive and siliconized release liner.
  - 1. Roll Length: 50 feet long.
  - 2. Width: 6 inches wide.
  - 3. Overlap joints at least 2 inches.
  - 4. Products:
    - a. Substitutions: See Section 01 60 00 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that surfaces and conditions are ready for work of this section.
- B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- C. Do not proceed with this work until unsatisfactory conditions have been corrected.

#### **3.02 PREPARATION**

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

#### **3.03 INSTALLATION**

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.
- D. Mechanically Fastened Sheets - On Exterior:
  - 1. Install sheets shingle fashion to shed water, with seams generally horizontal.
  - 2. Overlap seams as recommended by manufacturer, 6 inches, minimum.



3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches, minimum.
  4. For applications indicated to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners as recommended by manufacturer.
  5. Install air barrier underneath jamb flashings.
  6. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.
- E. Self-Adhered Sheets:
1. Prepare substrate in accordance with sheet manufacturer's installation instructions; fill and tape joints in substrate and between dissimilar materials.
  2. Lap sheets shingle fashion to shed water and seal laps airtight.
  3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
  4. Use same material, or other material approved by sheet manufacturer, to seal to adjacent substrates, and as flashing.
  5. At wide joints, provide extra flexible membrane allowing joint movement.
- F. Fluid-Applied Coatings or Membranes:
1. Prepare substrate in accordance with manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.
  2. Use flashing to seal to adjacent construction and to bridge joints in coating substrate.
- G. Openings and Penetrations in Exterior Air Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto air barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
  2. At openings 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 wide; do not seal sill flange.
  3. At openings with nonflanged frames, seal air barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.
  4. At head of openings, install flashing under air barrier extending at least 2 inches beyond face of jambs; seal air barrier to flashing.
  5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
  6. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
  1. Provide testing and inspection required by ABAA QAP.
  2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
  3. Cooperate with ABAA testing agency.
  4. Allow access to air barrier work areas and staging.
  5. Do not cover air barrier work until tested, inspected, and accepted.
- C. Do not cover installed air barriers until required inspections have been completed.
- D. Obtain approval of installation procedures from air barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- E. Take digital photographs of each portion of installation prior to covering up air barriers.

**3.05 PROTECTION**

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

**END OF SECTION**

**SECTION 07 31 13  
ASPHALT SHINGLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Metal flashing.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Edge and cap flashings.
- B. Section 07 72 00 - Roof Accessories: Snow guards.

**1.03 REFERENCE STANDARDS**

- A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017 (Reapproved 2023).
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- C. ASTM D3161/D3161M - Standard Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method) 2020.
- D. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules 2023.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- F. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing 2016a (Reapproved 2021).
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- H. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.
- I. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021a.
- J. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments 2023.
- K. NRCA (RM) - The NRCA Roofing Manual 2023.
- L. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating material characteristics, performance criteria, limitations, and \_\_\_\_\_.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.
- E. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacture of roofing systems similar to those required for this project, with not less than 5 years of documented experience.

- B. Installer Qualifications: Company specializing in installing asphalt shingles, with at least 3 years of documented experience.

#### **1.06 MOCK-UPS**

- A. Provide mock-up of 100 sq ft, including underlayment, shingles, eave protection membrane, and associated flashings.
- B. Locate as directed by Architect.
- C. Mock-up may remain as part of work.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store materials with labels intact in manufacturer's unopened packaging until ready for installation.
- B. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.
- C. Protect materials from harmful environmental elements, construction dust, direct sunlight, and other potentially detrimental conditions.
- D. When storing roofing materials on roofing system ensure that no damage occurs to supporting members and other materials.

#### **1.08 FIELD CONDITIONS**

- A. Do not install shingles, eave protection membrane or underlayment when surface, ambient air, or wind chill temperatures are below 45 degrees F.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Asphalt Shingles:
  - 1. Certaineed Roofing; Landmark Premium Shingles: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 2. GAF; Timberline HDZ RS Shingles: [www.gaf.com/#sle](http://www.gaf.com/#sle).

#### **2.02 ASPHALT SHINGLES**

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
  - 1. Fire Resistance: Class A, complying with ASTM E108.
  - 2. Wind Resistance: Class A, when tested in accordance with ASTM D3161/D3161M.

#### **2.03 SHEET MATERIALS**

- A. Eave Protection Membrane:
  - 1. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
- B. Eave Edge Starter Shingles: Glass felt base, with ceramic coated mineral granules tightly embedded in refined, water-resistant asphalt, complying with ASTM D3462/D3462M.
  - 1. Shingle Size: 7-5/8 by 38-3/4 inches, nominal.
- C. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
  - 1. Minimum Requirements: Comply with ICC-ES AC188.
  - 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
  - 3. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
  - 4. Water Vapor Permeance: 0.067 perm, when tested in accordance with ASTM E96/E96M, Procedure A (desiccant method).
  - 5. Performance: Meet or exceed requirements for ASTM D226/D226M, Type II asphalt-saturated organic felt.

6. Liquid Water Transmission: Passes ASTM D4869/D4869M.
7. Functional Temperature Range: From minus 70 degrees F to 212 degrees F.
8. Products:
  - a. Certaineed Roofing; DryRoof SA - Self-Adhered: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - b. System Components Corporation, Inc; FeITex SA300: [www.systemcomponents.net/#sle](http://www.systemcomponents.net/#sle).
  - c. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.04 METAL FLASHING**

- A. Metal Flashing: Prefinished galvanized steel; see Section 07 62 00.
- B. Metal Flashings: Provide sheet metal eave edge, gable edge, ridge, ridge vents, open valley flashing, chimney flashing, dormer flashing, and other flashing as indicated.
  1. Form flashings to profiles indicated on drawings.
  2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
  3. Hem exposed edges of flashings minimum 1/4 inch on underside.

#### **2.05 ACCESSORIES**

- A. Roofing Nails: Standard round wire shingle type, galvanized steel, stainless steel, aluminum roofing nails, or copper roofing nails, minimum 3/8-inch head diameter, 12-gauge, 0.109-inch nail shank diameter, 1-1/2 inches long and complying with ASTM F1667/F1667M.
- B. Asphalt Roof Cement: ASTM D4586/D4586M, asbestos-free.
- C. Snow Guards: See Section 07 72 00.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions prior to starting this work.
- B. Verify that roof deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

#### **3.02 PREPARATION**

- A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.
- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

#### **3.03 INSTALLATION**

- A. Eave Protection Membrane:
  1. Install eave protection membrane from eave edge to minimum 48 inches up-slope beyond interior face of exterior wall.
  2. Install eave protection membrane in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Underlayment:
  1. Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches; stagger end laps of each consecutive layer and nail in place.
  2. Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches; stagger end laps of each consecutive

- layer, nail in place, and weather lap minimum 4 inches over eave protection.
3. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.
- C. Valley Protection:
1. Install valley protection in accordance with SMACNA (ASMM), Detail as required and recommended by manufacturer for metal flashed valleys..
  2. Install flexible flashing in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
  3. At Exposed Valleys: Install one layer of sheet metal flashing, minimum 24 inches wide, centered over open valley and crimped to guide water flow. Weather lap joints minimum 2-inch wide band of lap cement along each edge of first layer, press roll roofing into cement, and nail in place minimum 18 inches on center and 1 inch from edges.
- D. Metal Flashing:
1. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
  2. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
  3. Secure in place with nails as required and or recommended by manufacturer, and conceal fastenings.
  4. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.
- E. Shingles:
1. Install shingles in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
    - a. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
    - b. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
  2. Place shingles in straight coursing pattern with 5-inch weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
  3. Project first course of shingles 3/4 inch beyond fascia boards.
  4. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
  5. Coordinate installation of roof mounted components or work projecting through roof with weathertight placement of counterflashings.
  6. Complete installation to provide weathertight service.

### **3.04 CLEANING**

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean exposed work upon 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 traffic over finished roof surface; protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged asphalt shingles or accessories before Date of Substantial Completion.

**END OF SECTION**

**SECTION 07 46 46  
FIBER-CEMENT SIDING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiber-cement siding.

**1.02 RELATED REQUIREMENTS**

- A. Section 05 40 00 - Cold-Formed Metal Framing: Water-resistive barrier under siding.

**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 C1186 - Standard Specification for Flat Fiber-Cement Sheets 2022, with Editorial Revision (2023).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
  - 1. Manufacturer's requirements for related materials to be installed by others.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods, including nail patterns.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, \_\_\_\_\_, and methods of anchorage.
- D. Test Report: Applicable model code authority evaluation report (e.g. ICC-ES).
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Maintenance Instructions: Periodic inspection recommendations and maintenance procedures.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified in this section with not less than three years of experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver and store materials in manufacturer's unopened packaging, with labels intact, until ready for installation.
- C. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.
- D. Protect materials from harmful environmental elements, construction dust, and other potentially detrimental conditions.

**1.07 FIELD CONDITIONS**

- A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

## **PART 2 PRODUCTS**

### **2.01 FIBER-CEMENT SIDING**

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
1. Style: Standard lap style.
  2. Texture: Simulated cedar grain.
  3. Length: 12 feet, nominal.
  4. Width (Height): 6 inches.
  5. Thickness: 5/16 inch, nominal.
  6. Finish: Factory applied primer.
  7. Color: As indicated on drawings.
  8. Warranty: 50 year limited; transferable.
  9. Products:
    - a. Allura, a division of Plycem USA, Inc: [www.allurausa.com/#sle](http://www.allurausa.com/#sle).
    - b. James Hardie Building Products, Inc: [www.jameshardie.com/#sle](http://www.jameshardie.com/#sle).
    - c. Nichiha USA, Inc: [www.nichiha.com/#sle](http://www.nichiha.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Panel Siding: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
1. Texture: Simulated cedar grain.
  2. Length (Height): 108 inches, nominal.
  3. Width: 48 inches.
  4. Thickness: 5/16 inch, nominal.
  5. Finish: Factory applied primer.
  6. Color: As indicated on drawings.
  7. Warranty: 50 year limited; transferable.
  8. Products:
    - a. Allura, a division of Plycem USA, Inc: [www.allurausa.com/#sle](http://www.allurausa.com/#sle).
    - b. James Hardie Building Products, Inc: [www.jameshardie.com/#sle](http://www.jameshardie.com/#sle).
    - c. Nichiha USA, Inc: [www.nichiha.com/#sle](http://www.nichiha.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Soffit Panels: Panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
1. Texture: Smooth.
  2. Length: 120 inches, nominal.
  3. Width: 48 inches.
  4. Thickness: 5/16 inch, nominal.
  5. Finish: Factory applied primer.
  6. Color: As indicated on drawings.
  7. Manufacturer: Same as siding.

### **2.02 ACCESSORIES**

- A. Furring Strips, Plastic: Mold resistant, nonabsorptive entangled polymer that promotes drainage and cross ventilation.
1. Width: 4 inches.
  2. Thickness: 3/8 inch, nominal.
  3. Length: 25 feet.
  4. Products:



- a. Keene Building Products; Easy-Fur - Rollable Furring Strip:  
[www.keenebuilding.com/#sle](http://www.keenebuilding.com/#sle).
  - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Trim: Anodized Aluminum.
- C. Metal Trim: Extruded aluminum alloy 6063-T5 temper.
  1. Finish: Color anodized.
  2. Color: To match siding color.
  3. Reveal Open Trim:
    - a. Type: As indicated on drawings.
    - b. Products:
      - 1) Tamlyn: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  4. Vertical Profile Trim:
    - a. Type: As indicated on drawings.
    - b. Products:
      - 1) Tamlyn: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  5. Horizontal Profile Trim:
    - a. Type: As indicated on drawings.
    - b. Products:
      - 1) Tamlyn: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
  6. Termination Profile Trim:
    - a. Type: As indicated on drawings.
    - b. Products:
      - 1) Tamlyn: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  7. Specialty Profile Trim:
    - a. Type: As indicated on drawings.
    - b. Products:
      - 1) Tamlyn: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  8. Outside Corner Trim:
    - a. Type: As indicated on drawings.
    - b. Products:
      - 1) Tamlyn: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  9. Inside Corner Trim:
    - a. Type: As indicated on drawings.
    - b. Products:
      - 1) Tamlyn: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  10. Water Management Profile Trim:
    - a. Type: Base of wall continuous J molding trim with vent and drainage perforations..
    - b. Products:
      - 1) Tamlyn; VSZ34: [www.tamlyn.com/#sle](http://www.tamlyn.com/#sle).
- D. Fasteners: Galvanized or corrosion resistant; length as required to penetrate, 1-1/4 inches, minimum.
- E. Exterior Soffit Vents: One piece, perforated, ASTM A653/A653M galvanized steel with G90 coating, with edge suitable for direct application to gypsum board and manufactured especially for soffit application, and provide continuous vent.

- F. Sealant: Elastomeric, polyurethane or silyl-terminated polyether/polyurethane, and capable of being painted.
- G. Finish Paint: Latex house paint acceptable to siding manufacturer; primer recommended by paint manufacturer.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that water-resistant barrier has been installed over substrate completely and correctly; see Section 05 40 00.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### **3.02 PREPARATION**

- A. Protect surrounding areas and adjacent surfaces during execution of this work.
- B. Install Sheet Metal Flashing:
  - 1. Above door and window trim and casings.
  - 2. Above horizontal trim in field of siding.

#### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and recommendations.
  - 1. Read warranty and comply with terms necessary to maintain warranty coverage.
  - 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
  - 3. Use trim details as indicated on drawings.
  - 4. Touch up field cut edges before installing.
  - 5. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- C. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.
- D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- E. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.
- F. Do not install siding less than 6 inches from ground surface, or closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- G. Exterior Soffit Vents: Install in accordance with manufacturer's written instructions and at locations indicated on drawings; provide vent area as indicated on drawings.
- H. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

#### **3.04 CLEANING**

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean faced panels in accordance with manufacturer's maintenance instructions, using cleaning materials and methods acceptable to manufacturer.

#### **3.05 PROTECTION**

- A. Protect installed products until Date of Substantial Completion.

- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

**SECTION 07 62 00  
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 as indicated, and other items indicated in Schedule.
- B. Sealants for joints within sheet metal fabrications.

**1.02 REFERENCE STANDARDS**

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- E. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017 (Reapproved 2023).
- F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- G. CDA A4050 - Copper in Architecture - Handbook current edition.
- H. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

**1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Sheet Metal Flashing and Trim Manufacturers:
  - 1. Taylor Metal Products.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.02 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
  - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: As selected by Architect from manufacturer's standard colors.
- B. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, (0.0156 inch) 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. Fabricate cleats of same material as sheet interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

## 2.04 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: Profile as indicated.
- B. Downspouts: Round profile.
- C. Gutters and Downspouts: Size indicated.
- D. Accessories: Profiled to suit gutters and downspouts.
  - 1. Gutter Supports: Straps and Brackets.
  - 2. Downspout Supports: Brackets.
- E. Downspout Boots: Steel.
- F. Seal metal joints.

## 2.05 EXTERIOR PENETRATION FLASHING PANELS

- 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: Galvanized steel, with soft neoprene washers.
- B. Underlayment: ASTM D226/D226M, organic roofing felt, Type I (No. 15).
- C. Primer: Zinc chromate type.
- D. Concealed Sealants: Non-curing butyl sealant.
- E. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- F. Plastic Cement: ASTM D4586/D4586M, Type I.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

- B. Verify roofing termination and base flashings are in place, sealed, and secure.

### **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.

### **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. Seal metal joints watertight.
- E. Secure gutters and downspouts in place with concealed fasteners.
- F. Slope gutters 1/4 inch per 10 feet, minimum.
- G. Connect downspouts to downspout boots, and grout connection watertight.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

**END OF SECTION**

**SECTION 07 72 00  
ROOF ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Curbs.
- B. Roof penetrations mounting curbs.
- C. Roof hatch for interior attic equipment access.
- D. Snow guards.

**1.02 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.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
  - 1. Snow Guards: Submit design calculations for loadings and spacings based on manufacturer testing.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

**PART 2 PRODUCTS**

**2.01 ROOF CURBS**

- A. Manufacturers:
  - 1. AES Industries Inc: [www.aescurb.com/#sle](http://www.aescurb.com/#sle).
  - 2. The Pate Company: [www.patecurbs.com/#sle](http://www.patecurbs.com/#sle).
  - 3. MKT Metal Manufacturing: [www.mktduct.com/#sle](http://www.mktduct.com/#sle).
  - 4. Roof Products & Systems (RPS): [www.rpscurbs.com/#sle](http://www.rpscurbs.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - 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. Galvanized Steel: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33; G60 coating designation; 18 gauge, 0.048 inch thick.
  - 3. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing system at 1:1 slope; minimum cant height 4 inches.
  - 4. 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 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 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.
5. Provide layouts and configurations indicated on drawings.
- C. Curbs Adjacent to Roof Openings: Provide curb on each side of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
  2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
  3. Height Above Roof Deck: 14 inches, minimum.
- D. Pipe, Duct, or Conduit Mounting Curbs: Vertical posts, minimum 8 inches square unless otherwise indicated.

## 2.02 ROOF HATCHES AND VENTS, MANUAL AND AUTOMATIC OPERATION

- A. Roof Hatch Manufacturers:
- B. Roof Hatches and Smoke Vents: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
1. Style: Provide flat metal covers unless otherwise indicated.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
1. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
  2. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
  3. Curb Height: 12 inches from finished surface of roof, minimum.
- D. Metal Covers: Flush, insulated, hollow metal construction.
1. Capable of supporting 40 psf live load.
  2. Material: Mill finished aluminum; outer cover 11 gauge, 0.0907 inch thick, liner 0.04 inch thick.
  3. Insulation: Manufacturer's standard 1 inch rigid glass fiber.
  4. Gasket: Neoprene, continuous around cover perimeter.
- E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
  2. Hinges: Heavy duty pintle type.
  3. Hold open arm with vinyl-coated handle for manual release.
  4. Latch: Upon closing, engage latch automatically and reset manual release.
  5. Manual Release: Pull handle on interior.
  6. Locking: Padlock hasp on interior.

## 2.03 SNOW GUARDS

- A. Unit Snow Guards: Individual projecting metal shapes, set between roofing shingles/tiles, and mechanically fastened to roof deck.
1. Projecting Metal Shapes: Zinc plated steel, triangular spike design.
  2. Placement: As indicated on drawings.
  3. Manufacturers:



- a. Alpine Snow Guards; PD10 Pad-Style Snow Guard:  
[www.alpinesnowguards.com/#sle](http://www.alpinesnowguards.com/#sle).
- b. Berger Building Products: [www.bergerbp.com/#sle](http://www.bergerbp.com/#sle).
- c. Rocky Mountain Snow Guards, Inc; ST9 Snow Guard:  
[www.rockymountainsnowguards.com/#sle](http://www.rockymountainsnowguards.com/#sle).
- d. TRA Snow and Sun: [www.trasnowandsun.com/#sle](http://www.trasnowandsun.com/#sle).
- e. Substitutions: See Section 01 60 00 - Product Requirements.

### **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.

**END OF SECTION**

**SECTION 07 84 00  
FIRESTOPPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

**1.02 REFERENCE STANDARDS**

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2022.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2023a.
- C. ITS (DIR) - Directory of Listed Products Current Edition.
- D. FM (AG) - FM Approval Guide Current Edition.
- E. UL 1479 - Standard for Fire Tests of Penetration Firestops Current Edition, Including All Revisions.
- F. UL (FRD) - Fire Resistance Directory Current Edition.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

**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. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

**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.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Firestopping Manufacturers:
  - 1. 3M Fire Protection Products: [www.3m.com/firestop/#sle](http://www.3m.com/firestop/#sle).
  - 2. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  - 3. Substitutions: See Section 01 60 00 - 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.

### **2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS**

- A. 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.

### **2.04 FIRESTOPPING PENETRATIONS THROUGH FRAMED FLOORS**

### **2.05 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS**

### **2.06 FIRESTOPPING SYSTEMS**

- A. Firestopping: Any material meeting requirements.
  - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or 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.

## **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.

**END OF SECTION**

**SECTION 07 92 00  
JOINT SEALANTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

**1.03 REFERENCE STANDARDS**

- A. ASTM 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 C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2023.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016 (Reapproved 2023).
- H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.
- I. ASTM C1311 - Standard Specification for Solvent Release Sealants 2022.
- J. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2023.
- K. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).
- L. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016 (Reapproved 2021).
- M. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2022.
- N. UL 263 - Standard for Fire Tests of Building Construction and Materials Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- 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.

### 1.05 QUALITY ASSURANCE

- A. 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 to manufacturer sufficient samples for testing.
  - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
  - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
  - 1. Dow Chemical Company: [consumer.dow.com/en-us/industry/ind-building-construction.html/#sle](http://consumer.dow.com/en-us/industry/ind-building-construction.html/#sle).
  - 2. Sika Corporation: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  - 3. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  - 4. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
  - 1. Dayton Superior Corporation: [www.daytonsuperior.com/#sle](http://www.daytonsuperior.com/#sle).
  - 2. Dow Chemical Company: [consumer.dow.com/en-us/industry/ind-building-construction.html/#sle](http://consumer.dow.com/en-us/industry/ind-building-construction.html/#sle).
  - 3. Sika Corporation: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  - 4. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  - 5. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
    - d. Openings below ledge angles in masonry.
    - e. Other joints indicated below.
  - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
    - c. Other joints indicated below.
  - 3. Do not seal the following types of joints.
    - a. Intentional weepholes in masonry.
    - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.

- c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
  - d. Joints where installation of sealant is specified in another section.
  - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
- 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
  - 2. Lap Joints between Manufactured Metal Panels: Butyl rubber, non-curing.
  - 3. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
- 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
  - 2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
  - 3. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
  - 4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
  - 5. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

### **2.03 JOINT SEALANTS - GENERAL**

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.
- B. Colors: Furnish and install color of exposed joint sealers indicated or, if not otherwise indicated,
- C. Compatibility: Furnish and install joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

### **2.04 NONSAG JOINT SEALANTS**

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
  - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
  - 4. Color: Match adjacent finished surfaces.
- B. Silicone Sealant: ASTM C920, Grade NS, Use T; single-component, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
  - 1. Movement Capability: Plus 100 percent and minus 50 percent, minimum.
  - 2. Color: To be selected by Architect from manufacturer's standard range.
- C. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
  - 1. Color: White.
- D. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum.
- E. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
  1. Movement Capability: Plus and minus 35 percent, minimum.
- F. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
  1. Color: Standard colors matching finished surfaces, Type OP (opaque).
- G. Acrylic Latex Sealant: ASTM C834; for use as acoustical sealant and in firestopping systems for expansion joints and through penetrations.
  1. Color: Standard colors matching finished surfaces.
  2. Fire Rated System: Complies with UL 263 and ASTM E119 with UL fire resistance classifications.
- H. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.

## **2.05 SELF-LEVELING SEALANTS**

- A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
  1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
  2. Color: Match adjacent color.
- B. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
  1. Movement Capability: Plus and minus 25 percent, minimum.
- C. Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M and O; multi-component; explicitly approved by manufacturer for horizontal expansion joints.
  1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.
- D. Flexible Polyurethane Foam: Single-component, gun grade, and low-expanding.
  1. Color: White.
- E. High Quality Latex-Based Sound Sealant: ASTM C834, Type OP an opaque sealant, and Grade 0, 32 degrees F, meets requirements for low-temperature flexibility.
- F. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
  1. Composition: Multi-component, 100 percent solids by weight.
  2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
  3. Color: To be selected by Architect from manufacturer's standard colors.
  4. Joint Width, Minimum: 1/8 inch.
- G. Semi-Self-Leveling Polyurethane Sealant: Intended for expansion joints in sidewalks, swimming pool decks, plazas, floors and other horizontal surfaces with up to 6 percent slope.
  1. Composition: Single or multi-component.
  2. Durometer Hardness, Type A: 35 to 45, minimum, when tested in accordance with ASTM D2240.
  3. Color: Gray.
  4. Tensile Strength: 250 to 300 psi in accordance with ASTM D412.

## 2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
  - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
  - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
  - 3. Open Cell: 40 to 50 percent larger in diameter than joint width.
  - 4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

### 3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

### 3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.



- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

**END OF SECTION**

**SECTION 08 11 13  
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, louvers, and matching panels.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2022.
- C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames 2020.
- 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 2023.
- 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. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- Q. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- S. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- T. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- U. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2023.

- V. UL (DIR) - Online Certifications Directory Current Edition.
- W. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- X. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

### **1.03 SUBMITTALS**

- A. See Section 01 30 00 - 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.

### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

### **1.05 WARRANTY**

- A. See Division 01, General Requirements for additional warranty requirements.
- B. See Division 01, General Requirements for additional warranty requirements.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. See Division 01, General Requirements for delivery, storage and handling requirements that are to be met prior to delivery to site.
- B. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- C. 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; Ceco Door 1 ¾" Trio-E Vertically Stiffened laminated core with Polyurethane Foamed in place door leaf and Ceco Door Mercury Series Thermally Broken Hollow Metal Frame: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 2. Curries, an Assa Abloy Group company: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 3. Steelcraft, an Allegion brand: [www.allegion.com/#sle](http://www.allegion.com/#sle).
  - 4. Stiles Custom Metal, Inc: [www.stilesdoor.com](http://www.stilesdoor.com).
  - 5. Substitutions: See Section 01 60 00 - 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: Manufacturers 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 (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- B. Hollow Metal Panels: Same construction, performance, and finish as doors.
- C. 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.
- B. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
  2. Door Core Material: Vertical steel stiffeners with fiberglass batts.
  3. Door Thermal Resistance: R-Value of that indicated in drawings.
  4. Door Thickness: 1-3/4 inches, nominal.
  5. Top Closures for Outswinging Doors: Flush with top of faces and edges.
  6. Door Face Sheets: Flush.
  7. Weatherstripping: Refer to Section 08 71 00.
- C. Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
  2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
  3. Door Thickness: 1-3/4 inches, nominal.
- D. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.

- d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
- e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
2. Fire Rating: As indicated on Door Schedule, 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. Smoke and Draft Control Doors (Indicated with letter "S" on Drawings and/or Door Schedule): Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
  - a. Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
  - b. Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
  - c. Label: Include the "S" label on fire-rating label of door.
5. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
6. Door Thickness: 1-3/4 inches, nominal.
7. Door Face Sheets: Flush.

#### **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 (galvanized) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
  2. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
  3. Weatherstripping: Separate, see Section 08 71 00.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
  1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
  1. Fire Rating: Same as door, labeled.
  2. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
- F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- H. Transom Bars: Fixed, of profile same as jamb and head.

#### **2.05 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

#### **2.06 ACCESSORIES**

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
  1. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
  2. Metal Finish: Gray polyester powder coating.
  3. Glazing: 1/4 inch thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
- B. Glazing: As specified in Section 08 80 00, factory installed.

- C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- D. Astragals for Double Doors: Specified in Section 08 7100.
  - 1. Fire-Rated Doors: Steel, shape as required for fire rating.
- E. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- F. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- G. 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.
- H. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

#### **3.02 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. Install door hardware as specified in Section 08 71 00.
  - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- E. Comply with glazing installation requirements of Section 08 80 00.
- F. Coordinate installation of electrical connections to electrical hardware items.
- G. 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 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.
- C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

#### **3.05 SCHEDULE**

- A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION**

**SECTION 08 14 16  
FLUSH WOOD DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, and acoustical.

**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 E413 - Classification for Rating Sound Insulation 2022.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- F. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- G. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - 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.
- D. Samples: Submit two samples of door veneer, 4 by 8 inches in size illustrating wood grain, stain color, and sheen.
- E. Warranty, executed in Owner's name.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

**1.05 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.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. 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. Oregon Door; Architectural Series: [www.oregondoor.com/#sle](http://www.oregondoor.com/#sle).
  - 2. VT Industries, Inc: [www.vtindustries.com/#sle](http://www.vtindustries.com/#sle).
  - 3. Algoma Hardwoods, Inc: [www.algomahardwoods.com](http://www.algomahardwoods.com).
  - 4. Lynden Door: [www.lyndendoor.com](http://www.lyndendoor.com)
  - 5. Vancouver Door: [www.vancouverdoor.com](http://www.vancouverdoor.com)
  - 6. Substitutions: See Section 01 60 00 - 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 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. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch wg pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.
  - 4. 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.
- C. Sound-Rated Doors: Equivalent to type, with particleboard core (PC) construction as required to achieve STC rating specified; plies and faces as indicated above.

### **2.04 DOOR FACINGS**

- A. Veneer Facing for Transparent Finish: Walnut, 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.

### **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.
  - 2. Provide solid blocking for other throughbolted hardware.
  - 3. Provide solid hardwood edge bands at top, bottom and side edges. All edges to be prepared to receive stain finish.
- C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.



- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. 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 08 11 13.
- B. Door Window Frames: Door window frames with glazing securely fastened within door opening.
  - 1. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
  - 2. Metal Finish: polyester powder coating.
  - 3. Manufacturers:
    - a. All Metal Stamping: [www.allmetalstamping.com/#sle](http://www.allmetalstamping.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Glazing: See Section 08 80 00.
- D. 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.
  - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. 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 08 31 00**  
**ACCESS DOORS AND PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall and ceiling mounted access units.

**1.02 REFERENCE STANDARDS**

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Project Record Documents: Record actual locations of each access unit.

**PART 2 PRODUCTS**

**2.01 ACCESS DOORS AND PANELS ASSEMBLIES**

- A. Wall-Mounted Units:
  - 1. Location: Provide general access doors for access to concealed spaces, equipment and controls whether indicated in drawings or not. At a minimum, provide code compliant, concealed space access. Reference Mechanical, Plumbing and Electrical for other location requirements.
  - 2. Panel Material: Steel Steel.
  - 3. Size: 12 by 12 inches and 24 by 24 inches at mechanical equipment unless indicated otherwise.
  - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
  - 6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
- B. Wall-Mounted Units in Wet Areas:
  - 1. Panel Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
  - 2. Size: 12 by 12 inches.
  - 3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
  - 5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
- C. Ceiling-Mounted Units:
  - 1. Location: General: Access doors to be provided for access to concealed spaces, equipment and controls whether indicated in drawings or not. At a minimum, provide code compliant, concealed space access. Reference Mechanical, Plumbing and Electrical for other location requirements..
  - 2. Panel Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
  - 3. Size - Lay-In Grid Ceilings: To match module of ceiling grid.
  - 4. Size - Other Ceilings: 12 by 12 inches and 24 by 24 inches at mechanical equipment unless indicated otherwise.
  - 5. Size: - Access Ladder: 24 x 36 at equipment access ladder through ceiling.
  - 6. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle except at attic access ladder.
- D. Fire-Rated Ceiling-Mounted Units:
  - 1. Ceiling Fire-Rating: As indicated on drawings.
  - 2. Size: 12 by 12 inches.

## **2.02 WALL AND CEILING MOUNTED ACCESS UNITS**

- A. Manufacturers:
  - 1. Babcock-Davis: [www.babcockdavis.com/#sle](http://www.babcockdavis.com/#sle).
  - 2. Milcor, Inc: [www.milcorinc.com/#sle](http://www.milcorinc.com/#sle).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Above Ceiling Access Ladder Hatch: Basis of Design: Babcock Davis - Floor Door BFDNPA36X36SFL-BI
- C. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  - 1. Door Style: Single thickness with rolled or turned in edges.
  - 2. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
  - 3. Steel Finish: Primed.
  - 4. Primed and Factory Finish: Polyester powder coat; color \_\_\_\_\_.
  - 5. Hardware:
    - a. Hardware for Fire-Rated Units: As required for listing.
    - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
    - c. Handle: (at access ladder) Handle and key operated cam latch.
    - d. Inside Latch Release: Mechanism that allows door/panel to be opened from inside.
    - e. Gasketing: (at access ladder) Extruded neoprene, around perimeter of door panel.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

### **3.03 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

## **END OF SECTION**

**SECTION 08 32 00  
SLIDING GLASS DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Factory fabricated sliding glazed doors with frames and operating hardware.

**1.02 REFERENCE STANDARDS**

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights 2022.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.
- D. AAMA 1801 - Voluntary Specification for the Acoustical Rating of Exterior Windows, Doors, Skylights and Glazed Wall Sections 2021.
- E. ASTM C1036 - Standard Specification for Flat Glass 2021.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- H. 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.
- I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2023).
- J. ASTM E413 - Classification for Rating Sound Insulation 2022.
- K. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation 2022.
- L. ASTM E1423 - Standard Practice for Determining Steady State Thermal Transmittance of Fenestration Systems 2021.
- M. ASTM E1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems 2014 (Reapproved 2023).
- N. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes 2023.
- O. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights 2023.
- P. ASTM F842 - Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact 2017 (Reapproved 2023).
- Q. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2023.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Shop Drawings: Indicate opening dimensions, elevations of different types, and framed opening tolerances.
- D. Certificate: Certify that sliding glass doors meet or exceed specified requirements.
- E. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of

those prescribed by specified grade .

- F. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

#### **1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of type specified in this section, with at least three years of documented experience.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to project site and store in manufacturer's protective cartons until openings are ready for door installation.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

#### **1.06 FIELD CONDITIONS**

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

#### **1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 5-year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units. Complete forms in Owner's name and register with manufacturer.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Aluminum Sliding Doors:
1. Arcadia, Inc: [www.arcadiainc.com/#sle](http://www.arcadiainc.com/#sle).
  2. ES Windows; ES-SD450: [www.eswindows.com/#sle](http://www.eswindows.com/#sle).
  3. Solar Innovations, Inc; Series SI8000 Sliding Glass Door: [www.solarinnovations.com/#sle](http://www.solarinnovations.com/#sle).
  4. Wausau Window and Wall Systems: [www.wausauwindow.com/#sle](http://www.wausauwindow.com/#sle).

#### **2.02 SLIDING GLASS DOORS**

- A. Aluminum Sliding Doors: Extruded aluminum unit frame and operable panel frame, factory fabricated, factory glazed; complete with integral sloped sill/threshold, flashings, and anchorage devices.
1. Configuration: Fixed and horizontal sliding panels as indicated on drawings.
  2. Finish: Color anodized.
  3. Color: Black.
  4. Frame Depth: 6 inches, maximum.
  5. Aluminum Members: Factory finished; screw lock corner construction; thermally broken.
  6. Drainage: Provide drainage to exterior for moisture entering joints and glazing spaces and for condensation occurring within frame construction.
  7. Glass Stops: Same material and color as frame, sloped for wash.
  8. Operable Panels: Stainless steel bottom rollers; adjustable.
  9. Hardware:
    - a. Ladder Pull: 12 inches long, with keyed dead lock.
    - b. Lock: Positive latch.
    - c. Single Action Latch Release: With privacy lever latch retraction via cylindrical lever.
- B. Interior Sliding Door Systems: Aluminum cased frame with receiving channel, adjustable top track assembly along with carriage assemblies; provide frames with integral double seal full gasketing; provide factory prepped locks and other related components in frame system.

1. Configuration: As indicated on drawings.
  2. Finish: Color anodized.
  3. Color: Black.
  4. Door Type: As indicated on drawings.
  5. Door Thickness: 1-3/4 inches.
  6. Wall Thickness: 4-7/8 inches.
  7. Glass Stops: Same material and color as frame, sloped for wash.
  8. Operable Panels: Adjustable, with stainless steel bottom rollers.
  9. Weight Rating: Door carriage assembly rated for 220 pounds or greater.
  10. Sound Rated Assemblies: Sound transmission class (STC) rating of 35, minimum.
  11. Hardware:
    - a. Ladder Pull: 12 inches long, with keyed dead lock.
    - b. Lock: Positive latch.
    - c. Single Action Latch Release: With privacy lever latch retraction via cylindrical lever.
- C. Construction: Factory assemble door frame as one unit, including head jambs, and sill; factory assemble operating and fixed panels.
1. Sizes: Allow for tolerances of rough framed openings, clearances, and shims around perimeter of assemblies.
  2. Joints and Connections: Flush, hairline width, and waterproof; accurately and rigidly joined corners.
  3. Sills: One piece, sloped to drain, with integral roller track.

### 2.03 COMPONENTS

- A. Door Product Type: SD - Sliding door, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
- B. Glazing: Double glazed, clear, Low-E coated, argon gas filled, fully tempered, with glass thicknesses as recommended by manufacturer for specified wind conditions.
1. Flat Glass: In accordance with ASTM C1036, Type I - Transparent Flat Glass, Quality-Q3 (architectural glass).
  2. Fully Tempered Glass: ASTM C1048, Kind FT - Fully Tempered.
  3. Outboard Lite: Class 1 - Clear Glass; ASTM C1036.
  4. Inboard Lite: Class 1 - Clear Glass; ASTM C1036.
  5. Air Space: 1/2 inch.
  6. Glazing Sound Transmission Class (STC): Provide manufacturer's standard STC rated type; ASTM E90.

### 2.04 PERFORMANCE REQUIREMENTS

- A. Sliding Glass Doors: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for door type SD:
1. Performance Class (PC): AW.
- B. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- C. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 for Wind Zone 4 - Additional Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
- D. Water Penetration Resistance: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 psf.
- E. Air Leakage: 0.10 cfm/sq ft maximum leakage at 6.27 psf pressure difference, when tested in accordance with ASTM E283/E283M.
- F. Door Frame Condensation Resistance Factor (CRF): CRF of 50, minimum, measured in accordance with AAMA 1503.
- G. Thermal Transmittance: U-factor of 0.35, maximum, that includes window glazing, door and frame system based on average window size required for project and determined in

accordance with AAMA 1503, ASTM E1423, or NFRC 100.

- H. Forced Entry Resistance (FER): Tested to comply with ASTM F842 requirements having at least Grade 10 performance for each required sliding door assembly.
- I. Acoustical Performance: STC rating of 35, when tested in accordance with ASTM E90, ASTM E1425, or AAMA 1801 and ratings derived from ASTM E413 and ASTM E1332, respectively.

## **2.05 ASSEMBLY**

- A. Factory assemble door frame as one unit, including head, jambs, and sill; factory assemble operating and fixed panels.
- B. Sizes: Allow for tolerances of rough framed openings, clearances, and shims around perimeter of assemblies.
- C. Joints and Connections: Flush, hairline width, and waterproof; accurately and rigidly joined corners.
- D. Sills: One piece, sloped to drain, with integral roller track.

## **2.06 ALUMINUM FINISHES**

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42, integrally colored anodic coating not less than 0.7 mil thick.
- B. Color: As scheduled.

## **2.07 ACCESSORIES**

- A. Pull Handles: Black Anodized.
  - 1. Color: As selected by Architect from manufacturer's full range.
  - 2. Include integral locking mechanism.
- B. Sliding Panel Bottom Rollers: Stainless steel, adjustable from interior.
- C. Limit Stops: Resilient rubber.
- D. Cylindrical Locks: Manufacturer's standard.
- E. Anchors: Hot-dipped galvanized or stainless steel.
- F. Bituminous Paint: Fibered asphaltic type.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that openings are ready to receive work and opening dimensions and clearances are as indicated on shop drawings.

### **3.02 PREPARATION**

- A. Prepare opening to permit correct installation of door unit in conjunction with air and vapor seal.
- B. Apply coat of bituminous paint on concealed aluminum surfaces in contact with cementitious or dissimilar materials.

### **3.03 INSTALLATION**

- A. Install sliding glass door units in accordance with manufacturer's instructions.
- B. Install exterior doors in accordance with ASTM E2112.
- C. Attach frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- D. Use anchorage devices to securely fasten sliding door assembly to wall construction without distortion or imposed stresses.
- E. Place threshold in bed of sealant.
- F. Install operating hardware.

**3.04 TOLERANCES**

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation from Plumb: 1/16 inch.
- C. Maximum Variation from Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 feet straight edge.

**3.05 ADJUSTING**

- A. Adjust hardware for smooth operation.

**3.06 CLEANING**

- A. Remove protective material from factory finished surfaces.
- B. Remove labels and visible markings.
- C. Wash surfaces by method recommended and acceptable to sealant and sliding glass door manufacturer; rinse and wipe surfaces clean.

**3.07 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.

**END OF SECTION**



**SECTION 08 43 13**  
**ALUMINUM-FRAMED STOREFRONTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of metal and glass.
- C. Aluminum doors and frames.
- D. Weatherstripping.

**1.02 REFERENCE STANDARDS**

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site 2015.
- B. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems 2014.
- C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.
- D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.
- F. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- J. 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.
- K. 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).
- L. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2023).
- M. 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).

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 2 x 3 inches in size illustrating finished aluminum surface, glass, glazing materials.

- E. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

#### **1.05 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.

#### **1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Provide manufacturer's standard warranty covering failure in material and workmanship, for a period of two years.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Basis of Design: Kawneer North America: [www.kawneer.com/#sle..](http://www.kawneer.com/#sle..)
- B. Aluminum-Framed Storefronts:
  - 1. C.R. Laurence Company, Inc; U.S. Aluminum: [www.crl-arch.com](http://www.crl-arch.com).
  - 2. EFCO, a Pella Company: [www.efcocorp.com](http://www.efcocorp.com).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING**

- A. Center-Set Style, Thermally-Broken:
  - 1. Basis of Design: Kawneer North America; Trifab VG 451UT: [www.kawneer.com/#sle](http://www.kawneer.com/#sle).
  - 2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

#### **2.03 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING**

- A. Center-Set Style:
  - 1. Basis of Design: Kawneer North America; Trifab VG 451T: [www.kawneer.com/#sle](http://www.kawneer.com/#sle).
  - 2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep..

#### **2.04 BASIS OF DESIGN -- SWINGING DOORS**

- A. Wide Stile, Monolithic Glazing:
  - 1. Basis of Design: Kawneer North America; 500 Tuffline Swing Door: [www.kawneer.com/#sle](http://www.kawneer.com/#sle).
- B. Wide Stile, Insulating Glazing, Thermally-Broken:
  - 1. Basis of Design: Kawneer North America: AA 425 Thermal Entrance: [www.kawneer.com/#sle](http://www.kawneer.com/#sle).
  - 2. Thickness: 1-3/4 inches.

#### **2.05 ALUMINUM-FRAMED STOREFRONT**

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
  - 1. Unitized, shop assembly.
  - 2. Glazing Rabbet: For 1/4 inch monolithic glazing.
  - 3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
  - 4. Finish: Class I natural anodized.
  - 5. 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.
6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
  7. 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.
  8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
  9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
  10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
  11. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.
- B. Performance Requirements
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    - a. Design Wind Loads: Comply with requirements of ASCE 7.
    - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
  2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
  3. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
  4. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
  5. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
  6. Overall U-value Including Glazing: 0.38 Btu/(hr sq ft deg F), maximum.

## 2.06 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
1. Framing members for interior applications need not be thermally broken.
  2. Glazing Stops: Flush.
  3. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.
- B. Glazing: See Section 08 80 00.
- C. Infill Panels: Insulated, aluminum, with edges formed to fit glazing channel and sealed.
1. Total Nominal Thickness: 1 inch.
  2. Face Sheet: \_\_\_\_ inch thick.
  3. Core: Glass fiber insulation core with R-value of \_\_\_\_.
  4. Back Sheet: \_\_\_\_ inch thick.
  5. Finish: Same as storefront.
- D. Swing Doors: Glazed aluminum.
1. Thickness: 2 inches.

## 2.07 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209/B209M.

- C. Fasteners: Stainless steel.
- D. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; finish to match framing members.
- E. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- F. Sealant for Setting Thresholds: Non-curing butyl type.
- G. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- H. Glazing Accessories: See Section 08 80 00.

## **2.08 FINISHES**

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

## **2.09 HARDWARE**

- A. For each door, include weatherstripping.
- B. Other Door Hardware: See Section 08 71 00.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- D. Weatherstripping: Thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.

## **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. Install glass and infill panels using glazing method required to achieve performance criteria; see Section 08 80 00.
- J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### **3.03 TOLERANCES**

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- B. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
  - 1. Perform a minimum of two tests in each designated area as indicated on drawings.
  - 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
  - 3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.
    - a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
- C. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

### **3.05 ADJUSTING**

- A. Adjust operating hardware and sash for smooth operation.

### **3.06 CLEANING**

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

### **3.07 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.

**END OF SECTION**

**SECTION 08 56 59**  
**SERVICE AND TELLER WINDOW UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Service and teller window units.
- B. Service and teller window units with pass-through device.

**1.02 REFERENCE STANDARDS**

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate work with adjacent materials specified in other sections and as indicated on drawings and approved shop drawings.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's product data for specified products indicating materials, operation, glazing, finishes, and installation instructions.
- C. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, anchors and fasteners, and installation clearances.
- D. Test Data: Test reports for specific window model and glazing to be furnished, showing compliance with all specified requirements; window and glazing may be tested separately, provided window test sample adequately simulates the glazing to be used.
- E. Manufacturer Qualification Statement.
- F. Installer Qualification Statement.
- G. Warranty: 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 products specified in this section with at least ten years documented experience, and with ability to provide test reports showing that their standard manufactured products meet the specified requirements.
- B. 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. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.
- B. Store units in area protected from exposure to weather and vandalism.

**1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Provide manufacturer's warranty agreeing to repair or replace units and their components that fail in materials or workmanship within five years from Date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Service and Teller Window Units:
  - 1. Basis of Design: Quikserv Corp – IFSC-4040 Black Anodized w/ shelf QSS-4612.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 SERVICE AND TELLER WINDOW UNITS**

- A. Location: Built within exterior wall, as indicated on drawings.
- B. Type of Use: Drive-through.
- C. Window Type: Sliding, single horizontal.
  - 1. Operation: Manual.
  - 2. Mounting: Flush with wall surface.
  - 3. Window Size: As indicated on drawings.
  - 4. Size of Counter Space: As indicated on drawings.
  - 5. Material: Aluminum.
    - a. Finish: Color anodized, black.
  - 6. Header: Manufacturer's standard type.
  - 7. Sill: Manufacturer's standard type.
- D. Glazing: Insulating glass, 1 inch overall depth, clear.
  - 1. Tempered safety glazing.

### **2.03 ASSEMBLY COMPONENTS**

- A. Windows: Factory-fabricated, finished, and glazed, with extruded aluminum frame and glazing stops; complete with hardware and anchors.
  - 1. Provide window units that are re-glazable from the secure side without dismantling the non-secure side of framing.
  - 2. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof. Fully weld corners.
  - 3. Apply factory finish to exposed surfaces.
  - 4. Wind Design: Design and size components to withstand dead loads and live loads caused by pressure and negative wind loads acting normal to plane of window as calculated in accordance with applicable code.

### **2.04 MATERIALS**

- A. Aluminum Extrusions: Minimum 1/8 inch thick frame and sash material complying with ASTM B221 and ASTM B221M.
- B. Concealed Steel Items: Galvanized in accordance with ASTM A123/A123M to thickness Grade 85, 2.0 ounces per square foot.
- C. Insulating Glass: Double pane insulating vision glass; 5/8 inch thick, minimum.
  - 1. Low-E coating on No. 2 surface.
- D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

### **2.05 FINISHES**

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

### **2.06 ACCESSORIES**

- A. Shelves: Stainless steel, 16 gauge, 0.0625 inch minimum thickness, wall mounted units.
- B. Hardware and Security Devices for Sliding Windows:
  - 1. Hook-Lock: Maximum security hook lock on each slider.
  - 2. Weatherstripping and Glazing Sealant: Factory applied.
  - 3. Bottom Sills: Stainless steel construction, no bottom tracks and no pop rivets.

4. Handles: Stainless steel, manufacturer's standard profile and finish.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that window openings are ready for installation of windows.
- B. Verify that correct embedded anchors are in place and in proper location; repair or replace anchors as required to achieve satisfactory installation.
- C. Notify Architect if conditions are not suitable for installation of units; do not proceed until conditions are satisfactory.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install units in correct orientation (inside/outside or secure/non-secure).
- C. Anchor units securely in manner so as to achieve performance specified.
- D. Set sill members and sill flashing in continuous bead of sealant.

#### **3.03 ADJUSTING**

- A. Adjust operating components for smooth operation while also maintaining a secure, weather-tight enclosure and a tight fit at the contact points; lubricate operating hardware.

#### **3.04 CLEANING**

- A. Remove protective material from factory finished surfaces.
- B. Clean exposed surfaces promptly after installation without damaging finishes.

**END OF SECTION**



**SECTION 08 71 00.12  
DOOR HARDWARE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Door finish hardware.

**1.02 RELATED SECTIONS**

- A. Section 081100: Metal Doors and Frames, to be provided templates.
- B. Section 082100: Wood Doors, to be provided templates.

**1.03 SUBMITTALS**

- A. Finish Hardware Schedule.
  - 1. Format: Comply with scheduling sequence and vertical format in DHI's (Door & Hardware Institute) "Sequence and Format for Hardware Schedule." Double space entries and number/date each page.
  - 2. Content:
    - a. Identification number, location, hand, fire rating, degree of opening and material of each door and frame.
    - b. Type, style, function, size, quantity and finish of each door hardware item.
      - 1) Include description and function of each lockset and exit device.
    - c. Complete designations of items required for each door or opening including name and manufacturer.
    - d. Fastenings and other pertinent information on attachment of hardware.
    - e. Explanation of abbreviations, symbols and codes contained in schedule.
    - f. Mounting locations for door hardware.
  - 3. Approval of this list by Architect not to relieve Contractor of responsibility to provide finish hardware components required for complete operating installation.
- B. Cut sheets:
  - 1. One (1) set of manufacturer cut sheets for each hardware item supplied.
- C. Templates/Diagrams:
  - 1. Deliver templates of approved finish hardware items compatible with other work.
  - 2. Electrical diagrams, including riser and point to point hook-up for each door with electrified hardware. Diagrams shall be submitted with the hardware submittal.

**1.04 QUALITY ASSURANCE**

- A. Provide services of an AHC or DAHC member of Door Hardware Institute to:
  - 1. Be available for consultation with Architect/Owner at no additional cost to Owner during progress of construction.
- B. Hardware consultant must be an employee of supplier.
- C. Hardware supplier shall have and maintain a factory direct status with all manufacturer's specified or approved during the course of the project.
- D. Where several manufacturer's are specified for one type of hardware, use only products of one manufacturer.
- E. Pre-Installation Conference: Prior to commencement of hardware work, schedule meeting with mutually agreeable time to include, Owner, Contractor, Contractor's field superintendent, hardware installer, and other interested parties to review methods and procedures to be used to achieve end results.

**1.05 REGULATORY REQUIREMENTS**

- A. Hardware to comply with applicable local and/or State fire and current building codes.
- B. Hardware installed at doors with U.L. fire-resistant rating to meet required rating.

- C. Doors installed for smoke protection to receive hardware as recommended by NFPA.
- D. Provide hardware according to requirements of Building Code for fire door assemblies labeled for fire resistance and smoke control ("S" label).
- E. Electric equipment to have U.L. approved listing for complete assembly.
- F. Comply with requirements of ANSI A117.1. and The Americans with Disabilities Act (ADA) and State Building Code regarding access for disabled.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on outside to indicate contents and specific locations in Work.
- B. Provide experienced employee designated to receive, take charge of, and distribute hardware at building site, and provide locked area for storage of hardware.
- C. Protect from damage.
  - 1. Store above ground and under cover.
- D. Stockpile items sufficiently in advance to assure proper and adequate provision in Work of those trades for interface with Work of this Section.

#### **1.07 KEYING INFORMATION:**

- A. If required provide keying and bitting information to owner at no cost.

#### **1.08 WARRANTY**

- A. Warrant operation of locksets for ten (10) years.
- B. Warrant operation of panic hardware for three (3) years.
- C. Warrant operation of closers for thirty (30) years.

#### **1.09 CERTIFICATION**

- A. Prior to Substantial Completion Date, provide written certificate that hardware is complete and conforms to Specifications and approved submittals.

### **PART 2 PRODUCTS**

#### **2.01 GENERAL**

- A. Fasteners:
  - 1. Furnish necessary flat head screws, bolts, and other fasteners of suitable size and type to anchor hardware in position for long life under hard use.
  - 2. Where necessary, furnish fasteners with expansion shields, sex bolts, and other anchors as required and recommended by hardware manufacturer.
    - a. Toggle Bolts: Not permitted.
  - 3. Provide fasteners which harmonize with hardware as to finish and material.
  - 4. Conceal if possible when door is in closed position; exposed fasteners to have Phillips head.
    - a. Through-Bolting Not Permitted.
- B. Where butts are required to swing 180 degrees, furnish butts of sufficient throw to clear trim.
  - 1. Furnish 1-1/2 pair of butts, minimum, per leaf unless specifically scheduled otherwise.
- C. Hardware Locations:
  - 1. Mount hardware at recommended location of manufacturer or per requirements of ANSI A117.1

#### **2.02 KEYING**

- A. Factory or locally key following:
  - 1. Provide a construction key system for all doors. Furnish (10) keys. Plastic cores will not be permitted.

2. Key into a Schlage Everest 29-S master key system. Meet with Owner to determine the specific final keying requirements. Furnish (2) change keys per cylinder. Install permanent cores when directed to do so by Owner.

### 2.03 TOOLS AND MANUALS

- A. Deliver to Owner one complete set of adjustment tools and one set of maintenance manuals and installation instructions for locksets, closers, and exit devices.

### 2.04 ACCEPTABLE PRODUCTS

- A. Single Source:
  1. Except as specifically otherwise approved in advance by Architect, furnish for each items only product of a single manufacturer.
- B. Hinges: Ives, or equivalent by McKinney, Stanley.
  1. Standard Hinges: Mortise type with ball bearings.
    - a. Out-swinging doors with locks to have non-removable pins.
- C. Locks and Latches: Schlage- no substitution.
  1. Latchbolt: Anti-friction type with curved strike lip.
    - a. Provide extended lip where necessary to protect door frame trim from damage.
    - b. Match hardware finish.
  2. Fabricate with 3 3/4 inches backset from door edge where surface applied gasketing at door frame stops and 2 3/4 inches elsewhere.
  3. Type: Lever handle, unless otherwise noted.
- D. Panic Hardware: Von Duprin- no substitution.
  1. Furnish with provisions for concealed mounting.
    - a. Through-bolts not acceptable unless required by fire codes or fire tests.
  2. Include impact resistant, flush mounted end cap.
    - a. End caps to be of heavy-duty alloy construction and provide horizontal adjustment for flush alignment with device cover plate.
    - b. No raised edges to protrude from end cap.
  3. Furnish with:
    - a. Deadlocking latchbolts and roller strikes.
  4. Filler Plates: Furnish shim kits for flush mounting of exit devices on doors.
  5. Include EPT power transfers, PS902 power supply and CON connector cables at electrified openings.
- E. Door Closers: LCN- no substitution.
  1. Mount on room side, not corridor or lobby side of doors bordering circulation system unless otherwise shown.
  2. Fasteners: Concealed.
  3. Closer to have:
    - a. Cast-iron construction
    - b. Handed for specific usage
    - c. Heavy duty arms
  4. Pressure relief valves: Not permitted.
- F. Auto Door Operators and Actuators: LCN- no substitution. LCN, Wikk or BEA are acceptable for touchless actuators.
  1. Mount on room side, not corridor or lobby side of doors bordering circulation system unless otherwise shown.
  2. Fasteners: Concealed.
  3. Closer to have:
    - a. Cast-iron construction
    - b. Handed for specific usage
    - c. Heavy duty arms

- 4. Pressure relief valves: Not permitted.
- G. Overhead stops: Glynn Johnson, or equivalent by Rixson.
- H. Stops, Kickplates: Ives, or equivalent by Trimco.
  - 1. Do not use floor stops unless specifically approved by Architect or shown otherwise.
  - 2. If wall stops cannot be installed so as to be in contact with lock/latch half of door leaf, provide concealed or surface overhead holder.
  - 3. Kickplates shall have beveled edges on all sides.
- I. Finishes: As shown on Door Hardware Groups.
- J. Manufacturer and Acceptable Substitutes:

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine conditions under which Work of this Section will be performed.
  - 1. Correct conditions detrimental to timely and proper completion of Work.
  - 2. Do not proceed until unsatisfactory conditions are corrected.
- B. Protect work of others from damage.

#### **3.02 COORDINATION**

- A. Coordinate as necessary with other trades to assure proper and adequate provision in Work of those trades for interface with Work of this Section.

#### **3.03 INSTALLATION**

- A. Install Work of this Section in accordance with:
  - 1. Hardware groups specified.
  - 2. Approved Schedule.
  - 3. Applicable requirements of governmental agencies having jurisdiction.
  - 4. Templates.
  - 5. Manufacturer's and referenced standard's recommended installation procedures.
- B. All work on existing doors shall include patching, painting/staining to provide a finished product. If any cover plates are necessary to hide original door preps, consult with architect on proper selection before performing this work.
- C. Accurately locate, fit and install square, plumb and true.
  - 1. Provide hairline fit at joints
  - 2. Securely fasten.
- D. Cut and fit threshold or floor plates to door frame profile and with mitered corner joints; weld multiple pieces together and set in full bead of sealant.
  - 1. Secure to substrate with positive anchoring devices.
- E. After fitting mortised hardware to surfaces to be painted, remove and store hardware in original package in secure place until painting is completed, then install permanently.

#### **3.04 CLEANING, ADJUSTMENT AND PROTECTION**

- A. Clean, without damaging, exposed surfaces affected by work of this Section and repair as necessary.
- B. Remove from site refuse created by this Work, and dispose of in legal manner.
- C. Remove protective coating completely from exposed surfaces as soon as progress of Work permits with safety.
- D. Properly wrap hardware subjected to hand usage during construction for protection; hardware finish damaged through carelessness to be replaced at no expense to Owner.
- E. Upon completion of Work, and as condition of its acceptance, provide inspection, and adjustment.

1. At time of Substantial Completion, during and at end of warranty period, test, adjust and where necessary lubricate moving parts including keyways for free, smooth and quiet operation.
2. After ventilation system is balanced, adjust closers as necessary to meet ADA and Building Code regarding time required for closing operation and force required to open and provide written report pertaining to overall operation and installation of hardware.

**3.05 FINISH HARDWARE GROUPS**

**HARDWARE GROUP NO. 01**

<b>100</b>					
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**PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:**

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	<input type="checkbox"/>		613	IVE
1	EA	PANIC HARDWARE	CD-3549A-EO	<input type="checkbox"/>		313	VON
1	EA	PANIC HARDWARE	CD-3549A-T-360T	<input type="checkbox"/>		US10B/313	VON
3	EA	MORTISE CYLINDER	20-061 ICX 36-083	<input type="checkbox"/>		613	SCH
3	EA	FSIC CORE	23-030 EV29 S (CONFIRM KEYWAY WITH OWNER)	<input type="checkbox"/>		606	SCH
2	EA	LONG DOOR PULL	9264F 72" O MB	<input type="checkbox"/>		613	IVE
1	EA	OH STOP	100S (AUTO OPERATOR LEAF)	<input type="checkbox"/>		613	GLY
1	EA	CLOSER W/STOP ARM	4111 SCUSH WMS	<input type="checkbox"/>		695	LCN
1	EA	SURF. AUTO OPERATOR	4642 WMS 120 VAC	<input type="checkbox"/>	~	695	LCN
2	EA	ACTUATOR, TOUCHLESS	8310-813J	<input type="checkbox"/>	~	BLK	LCN
1	SET	WEATHER STRIPPING	PROVIDED BY DOOR/FRAME MANUFACTURER				
2	EA	DOOR SWEEP	8198D	<input type="checkbox"/>		D	ZER
1	EA	THERMALLY BROKEN THRESHOLD	626D-223	<input type="checkbox"/>		D	ZER

**AUTO OPERATOR REQUIRES 120VAC.**

**HARDWARE GROUP NO. 02**

102.1

**PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:**

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	<input type="checkbox"/>		640	IVE
1	EA	PASSAGE SET	ALX10 ATH	<input type="checkbox"/>		613	SCH
1	EA	CLOSER W/STOP ARM	4111 SCUSH WMS	<input type="checkbox"/>		695	LCN
1	EA	GASKETING	488SBK PSA (FOR SOUND)	<input type="checkbox"/>		BK	ZER

**HARDWARE GROUP NO. 03**

102.2      104.1      104.2

**PROVIDE EACH SL DOOR(S) WITH THE FOLLOWING:**

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
1			HARDWARE BY DOOR MANUFACTURER				

**HARDWARE GROUP NO. 04**

106

**PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:**

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>		640	IVE
1	EA	ENTRANCE/OFFICE LOCK	ALX50T ATH	<input type="checkbox"/>		613	SCH
1	EA	FSIC CORE	23-030 EV29 S (CONFIRM KEYWAY WITH OWNER)	<input type="checkbox"/>		606	SCH
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>		613	IVE
1	EA	GASKETING	488SBK PSA (FOR SOUND)	<input type="checkbox"/>		BK	ZER

**HARDWARE GROUP NO. 05**

107

**PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:**

QTY		DESCRIPTION	CATALOG			FINISH	MFR
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			NUMBER			
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>		640 IVE
1	EA	ENTRANCE/OFFICE LOCK	ALX50T ATH	<input type="checkbox"/>		613 SCH
1	EA	FSIC CORE	23-030 EV29 S (CONFIRM KEYWAY WITH OWNER)	<input type="checkbox"/>		606 SCH
1	EA	SURFACE CLOSER	4011 WMS	<input type="checkbox"/>		695 LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>		613 IVE
1	EA	WALL STOP/HOLDER	WS45	<input type="checkbox"/>		613 IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>		GRY IVE

**HARDWARE GROUP NO. 06**

108						
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**PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:**

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	<input type="checkbox"/>		613	IVE
1	EA	PANIC HARDWARE	LD-98-NL	<input type="checkbox"/>		313	VON
1	EA	RIM CYLINDER	20-057 ICX	<input type="checkbox"/>		613	SCH
1	EA	FSIC CORE	23-030 EV29 S (CONFIRM KEYWAY WITH OWNER)	<input type="checkbox"/>		606	SCH
1	EA	CLOSER W/STOP ARM	4111 SCUSH WMS	<input type="checkbox"/>		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>		613	IVE
1	EA	RAIN DRIP	142D	<input type="checkbox"/>		D	ZER
1	EA	WEATHERSTRIP	188SBK PSA	<input type="checkbox"/>		BK	ZER
1	EA	DOOR SWEEP	8198D	<input type="checkbox"/>		D	ZER
1	EA	THERMALLY	626D-223	<input type="checkbox"/>		D	ZER

		<b>BROKEN THRESHOLD</b>					
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**HARDWARE GROUP NO. 07**

<b>109</b>	<b>110</b>				
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**PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:**

<b>QTY</b>		<b>DESCRIPTION</b>	<b>CATALOG NUMBER</b>			<b>FINISH</b>	<b>MFR</b>
<b>3</b>	<b>EA</b>	<b>HINGE</b>	<b>5BB1 4.5 X 4.5</b>	<input type="checkbox"/>		<b>640</b>	<b>IVE</b>
<b>1</b>	<b>EA</b>	<b>PRIVACY W/OCCUP. INDICATOR</b>	<b>L9056T 07A L583-363 L283-722</b>	<input type="checkbox"/>		<b>643E</b>	<b>SCH</b>
<b>1</b>	<b>EA</b>	<b>FSIC CORE</b>	<b>23-030 EV29 S (CONFIRM KEYWAY WITH OWNER)</b>	<input type="checkbox"/>		<b>606</b>	<b>SCH</b>
<b>1</b>	<b>EA</b>	<b>SURFACE CLOSER</b>	<b>4011 WMS</b>	<input type="checkbox"/>		<b>695</b>	<b>LCN</b>
<b>1</b>	<b>EA</b>	<b>KICK PLATE</b>	<b>8400 10" X 2" LDW B-CS</b>	<input type="checkbox"/>		<b>613</b>	<b>IVE</b>
<b>1</b>	<b>EA</b>	<b>WALL STOP</b>	<b>WS406/407CVX</b>	<input type="checkbox"/>		<b>613</b>	<b>IVE</b>
<b>1</b>	<b>EA</b>	<b>GASKETING</b>	<b>488SBK PSA (FOR SOUND)</b>	<input type="checkbox"/>		<b>BK</b>	<b>ZER</b>

**END OF SECTION**



**SECTION 08 80 00  
GLAZING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

**1.02 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015 (Reaffirmed 2020).
- C. 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 C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass 2019.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016 (Reapproved 2023).
- I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2021a.
- J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2019.
- L. GANA (GM) - GANA Glazing Manual 2022.
- M. GANA (SM) - GANA Sealant Manual 2008.
- N. GANA (LGRM) - Laminated Glazing Reference Manual 2019.
- O. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use 1990 (2016).
- P. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2023.
- Q. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2023.
- R. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2023.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify

available colors.

- D. Samples: Submit two samples 12 by 12 inch in size of glass units.
- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. 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. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods.
- 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.

#### **1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Glass Fabricators:
  - 1. Viracon, Inc: [www.viracon.com/#sle](http://www.viracon.com/#sle).
  - 2. Old Castle.
  - 3. Norhtwestern Industries
  - 4. Hartung
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Float Glass Manufacturers:
  - 1. Cardinal Glass Industries: [www.cardinalcorp.com/#sle](http://www.cardinalcorp.com/#sle).
  - 2. Guardian Glass, LLC: [www.guardianglass.com/#sle](http://www.guardianglass.com/#sle).
  - 3. Pilkington North America Inc: [www.pilkington.com/na/#sle](http://www.pilkington.com/na/#sle).
  - 4. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Laminated Glass Manufacturers:
  - 1. Cardinal Glass Industries: [www.cardinalcorp.com/#sle](http://www.cardinalcorp.com/#sle).
  - 2. Viracon, Architectural Glass segment of Apogee Enterprises, Inc: [www.viracon.com/#sle](http://www.viracon.com/#sle).
  - 3. {CH#87991}.
  - 4. Norhtwestern Industries
  - 5. Hartung
  - 6. Substitutions: See Section 01 60 00 - 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. Design Pressure: Calculated in accordance with ASCE 7.
  - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.

3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7
  4. 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.
  5. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
1. In conjunction with vapor retarder and joint sealer materials described in other sections.
    - a. Refer to Section 07 25 00.
  2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
  3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.
- 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. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
  2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
  3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
  2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

### 2.04 INSULATING GLASS UNITS

- A. Manufacturers:
1. Any of the manufacturers specified for float glass.
  2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
  3. Cardinal Glass Industries: [www.cardinalcorp.com/#sle](http://www.cardinalcorp.com/#sle).
  4. Guardian Glass, LLC: [www.guardianglass.com/#sle](http://www.guardianglass.com/#sle).
  5. Pilkington North America Inc: [www.pilkington.com/na/#sle](http://www.pilkington.com/na/#sle).Pilkington North America Inc: [www.pilkington.com/na/#sle](http://www.pilkington.com/na/#sle).
  6. Viracon, Apogee Enterprises, Inc: [www.viracon.com/#sle](http://www.viracon.com/#sle).
  7. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
- 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: Black.
  5. Edge Seal:

- a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
- b. Color: Black.
6. Purge interpane space with dry air, hermetically sealed.
7. Capillary Tubes: Provide tubes from air space for insulating glass units without inert type gas that have a change of altitude greater than 2500 feet between point of fabrication and point of installation to permit pressure equalization of air space.
  - a. Capillary Tubes: Tubes to remain open and be of length and material type in accordance with insulating glass fabricator's requirements.
- C. Type IG-1 - Insulating Glass Units: Vision glass, double glazed.
  1. Applications: Exterior glazing unless otherwise indicated.
  2. Space between lites filled with 90 percent argon.
  3. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum. Tempered safety glass where required by code.
    - a. Tint: Clear.
    - b. Coating: Low-E (passive type), on #2 surface.
  4. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
  5. Total Thickness: 1 inch.
  6. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.32, maximum.
  7. Visible Light Transmittance (VLT): 55 percent, nominal.
  8. Solar Heat Gain Coefficient (SHGC): 0.30, nominal.
  9. Visible Light Reflectance, Outside: 6 percent Interior: 12 percent, nominal.
  10. Glazing Method: Wet glazing method, sealant and sealant.
- D. Type IG-5 - Insulating Glass Units: Safety glazing.
  1. Applications:
    - a. Glazed lites in exterior doors.
    - b. Glazed sidelights and panels next to exterior doors.
    - c. Other locations required by applicable federal, state, and local codes and regulations.
    - d. Other locations indicated on drawings.
  2. Space between lites filled with argon.
  3. Glass Type: Same as Type IG-1 except use fully tempered float glass for both outboard and inboard lites.
  4. Total Thickness: 1 inch.
  5. Thermal Transmittance (U-Value), Summer - Center of Glass: \_\_\_\_\_, nominal.

## 2.05 GLAZING UNITS

- A. Type G-2 - Monolithic Interior Vision Glazing:
  1. Applications: Interior glazing unless otherwise indicated.
  2. Glass Type: Heat-strengthened float glass.
  3. Tint: Clear.
  4. Thickness: 1/4 inch, nominal.
  5. Glazing Method: Wet glazing method, sealant and sealant.
- B. Type G-5 - Interior Monolithic Safety Glazing: Non-fire-rated.
  1. Applications:
    - a. Glazed lites in interior doors, except fire doors.
    - b. Glazed sidelights to interior doors, except in fire-rated walls and partitions.
    - c. Other locations required by applicable federal, state, and local codes and regulations.
    - d. Other locations indicated on drawings.
  2. Glass Type: Fully tempered safety glass as specified.
  3. Tint: Clear.

4. Thickness: 1/4 inch, nominal.

## **2.06 GLAZING COMPOUNDS**

- A. Type GC-3 - Polysulfide Sealant: Two component; chemical curing, non-sagging type; ASTM C920 Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.
- B. Type GC-4 - Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.
- C. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

## **2.07 ACCESSORIES**

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
  1. Width: As required for application.
  2. Thickness: As required for application.
  3. Spacer Rod Diameter: As required for application.
- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color as selected.
- E. Glazing Clips: Manufacturer's standard type.

## **PART 3 EXECUTION**

### **3.01 VERIFICATION OF CONDITIONS**

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

### **3.03 INSTALLATION, GENERAL**

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in

glazing referenced standards.

- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

### **3.04 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)**

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Place setting blocks at 1/4 points and install glazing pane or unit.
- C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- D. Fill gaps between glazing and stops with sealant type recommended by manufacturer to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

### **3.05 CLEANING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove non-permanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. 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.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**

**SECTION 08 83 00  
MIRRORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Glass mirrors.
  - 1. Tempered safety glass.

**1.02 REFERENCE STANDARDS**

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- C. GANA (GM) - GANA Glazing Manual 2022.
- D. GANA (SM) - GANA Sealant Manual 2008.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - 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. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods.
- B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with manufacturer's recommendations.

**1.05 FIELD CONDITIONS**

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Mirrors:
  - 1. Binswanger Mirror/ACI Distribution: [www.binswangerglass.com/#sle](http://www.binswangerglass.com/#sle).
  - 2. Lenoir Mirror Co: [www.lenoirmirror.com/#sle](http://www.lenoirmirror.com/#sle).
  - 3. Trulite Glass and Aluminum Solutions: [www.trulite.com/#sle](http://www.trulite.com/#sle).
  - 4. Walker Glass Company Ltd; Walker Glass Mirrors: [www.walkerglass.com/#sle](http://www.walkerglass.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - 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, tempered safety glass; ASTM C1048, with copper and silver coatings, and protective overcoating.

1. Thickness: 1/4 inch.
2. Edges: Arrised.
3. Size: As indicated on drawings.

### **2.03 GLAZING COMPOUNDS**

- A. Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25, Uses M and A; single component; solvent curing; non-bleeding, non-staining, cured Shore A hardness of 15 to 25; clear color.

### **2.04 ACCESSORIES**

- A. Mirror Attachment Accessories: Stainless steel J-profile channels.
- B. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.
  1. Application Temperature: Minus 35 to 140 degrees F at contact surfaces.
  2. Volatile Organic Content (VOC): Less than 7 percent by weight.
- C. Rolled Formed Frame: One piece, roll-formed angle frame, stainless steel, Type 430, satin finish, with welded frame corners, ground and polished smooth.

## **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.

### **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.
- D. Installation in Frames:
  1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
  2. Place setting blocks at one-quarter points with edge block no more than 6 inches from corners.
  3. Rest mirrors on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
  4. Place glazing tape on free perimeter of mirrors in same manner described above.
  5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
  6. Trim protruding tape edge.
- E. Frameless Mirrors: Set mirrors in proper place with adhesive, applied in accordance with adhesive manufacturer's instructions.

### **3.04 CLEANING**

- A. Remove labels after work is complete.
- B. Clean mirrors and adjacent surfaces.

**END OF SECTION**



**SECTION 08 91 00  
LOUVERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Louvers, frames, and accessories.

**1.02 REFERENCE STANDARDS**

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices 2021, with Editorial Revision (2022).
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames.
- D. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.
- E. Test Reports: Independent agency reports showing compliance with specified performance criteria.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Maintenance Data: Include lubrication schedules, adjustment requirements.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Louvers:
  - 1. Construction Specialties, Inc; Acoustical Louver: [www.c-sgroup.com/#sle](http://www.c-sgroup.com/#sle).
  - 2. Ruskin Company; Louvers: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 LOUVERS**

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
  - 1. Wind Load Resistance: Design to resist positive and negative wind load as required by code without damage or permanent deformation.
  - 2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
  - 3. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

- B. Stationary Louvers: Horizontal blade, formed galvanized steel sheet construction, with intermediate mullions matching frame.
  - 1. Free Area: 50 percent, minimum.
  - 2. Blades: Straight.
  - 3. Frame: 4 inches deep, channel profile; corner joints mitered and , with continuous recessed caulking channel each side.
  - 4. Steel Thickness, Galvanized: Frame 16 gauge, 0.0598 inch minimum base metal; blades 16 gauge, 0.0598 inch minimum base metal.
  - 5. Steel Finish: Superior performing organic coating, finished after fabrication.

### **2.03 MATERIALS**

- A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

### **2.04 FINISHES**

- A. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

### **2.05 ACCESSORIES**

- A. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- B. Insect Screen: 18 x 16 size aluminum mesh.
- C. Fasteners and Anchors: Stainless steel.
- D. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- E. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated.

### **3.02 INSTALLATION**

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- D. Secure louver frames in openings with concealed fasteners.
- E. Coordinate with installation of mechanical ductwork.

### **3.03 ADJUSTING**

- A. Adjust operable louvers for freedom of movement of control mechanism. Lubricate operating joints.

### **3.04 CLEANING**

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

**END OF SECTION**

**SECTION 09 05 61**  
**COMMON WORK RESULTS FOR FLOORING PREPARATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
  - 1. Resilient tile and sheet.
  - 2. Carpet tile.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
  - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- E. Patching compound.
- F. Remedial floor coatings.
- G. Remedial floor sheet membrane.

**1.02 REFERENCE STANDARDS**

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2022.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2023.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

**1.04 SUBMITTALS**

- A. Visual Observation Report: For existing floor coverings to be removed.
- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
  - 1. Moisture and alkalinity (pH) limits and test methods.
  - 2. Manufacturer's required bond/compatibility test procedure.
- C. Testing Agency's Report:
  - 1. Description of areas tested; include floor plans and photographs if helpful.
  - 2. Summary of conditions encountered.
  - 3. Moisture and alkalinity (pH) test reports.
  - 4. Copies of specified test methods.
  - 5. Recommendations for remediation of unsatisfactory surfaces.
  - 6. Product data for recommended remedial coating.
  - 7. Submit report to Architect.
  - 8. Submit report not more than two business days after conclusion of testing.
- D. Adhesive Bond and Compatibility Test Report.

### 1.05 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
  - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
  - 2. Acceptable Testing Agencies:
    - a. Independent Floor Testing & Inspection, Inc. (IFTI): [www.ifti.com/#sle](http://www.ifti.com/#sle).
    - b. Other testing agency approved by Owner.
- D. Contractor's Responsibility Relating to Independent Agency Testing:
  - 1. Provide access for and cooperate with testing agency.
  - 2. Confirm date of start of testing at least 10 days prior to actual start.
  - 3. Allow at least 4 business days on site for testing agency activities.
  - 4. Achieve and maintain specified ambient conditions.
  - 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

### 1.07 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
  - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
  - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.

1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
  2. Use product recommended by testing agency.
- D. Remedial Floor Sheet Membrane: Pre-formed multi-ply sheet membrane installed over concrete subfloor and intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.

### **PART 3 EXECUTION**

#### **3.01 CONCRETE SLAB PREPARATION**

- A. Perform following operations in the order indicated:
1. Preliminary cleaning.
  2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
  3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  5. Specified remediation, if required.
  6. Patching, smoothing, and leveling, as required.
  7. Other preparation specified.
  8. Adhesive bond and compatibility test.
  9. Protection.
- B. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
  2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
  3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

#### **3.02 PRELIMINARY CLEANING**

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

#### **3.03 MOISTURE VAPOR EMISSION TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

### **3.04 ALKALINITY TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
  - 1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
  - 2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
- C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

### **3.05 PREPARATION**

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with recommendations of testing agency.
- C. Comply with requirements and recommendations of floor covering manufacturer.
- D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- E. Do not fill expansion joints, isolation joints, or other moving joints.

### **3.06 ADHESIVE BOND AND COMPATIBILITY TESTING**

- A. Comply with requirements and recommendations of floor covering manufacturer.

### **3.07 APPLICATION OF REMEDIAL FLOOR COATING**

- A. Comply with requirements and recommendations of coating manufacturer.

### **3.08 INSTALLATION OF REMEDIAL FLOOR SHEET MEMBRANE**

- A. Install in accordance with sheet membrane manufacturer's instructions.

**END OF SECTION**

**SECTION 09 21 16  
GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal channel ceiling framing.
- C. Cementitious backing board.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.

**1.02 REFERENCE STANDARDS**

- A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2018.
- B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units 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 C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness 2022.
- I. 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.
- J. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- K. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel 2018.
- L. ASTM C1288 - Standard Specification for Fiber-Cement Interior Substrate Sheets 2017, with Editorial Revision (2023).
- M. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units 2022, with Editorial Revision (2023).
- N. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- O. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels 2023.
- P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

- S. ASTM E413 - Classification for Rating Sound Insulation 2022.
- T. GA-216 - Application and Finishing of Gypsum Panel Products 2021.
- U. GA-600 - Fire Resistance and Sound Control Design Manual 2021.
- V. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- W. UL (FRD) - Fire Resistance Directory Current Edition.

### **1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Design Calculations: For suspended gypsum board ceilings. Submit as a deferred submittal, to governing authorities having jurisdiction.
  - 1. Design calculations to be stamped and signed by Professional Structural Engineer as defined by Quality Assurance article.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

### **1.04 QUALITY ASSURANCE**

- A. Provide design calculations and design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

### **1.05 MOCK-UP**

- A. Texture Mock-up: Upon completion of joint treatment, provide an in-place wall texture mock-up for approval by the Architect, minimum 4 feet wide by 8 feet tall. The approved sample will be the basis of for all textured areas. Areas installed that do not match the sample will be subject to texture reapplication.

## **PART 2 PRODUCTS**

### **2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  - 1. See PART 3 for finishing requirements.
- B. Interior Partitions: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire-Resistance-Rated Assemblies: Provide completed assemblies as indicated by wall types in drawings.
  - 1. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
  - 2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
  - 3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

### **2.02 METAL FRAMING MATERIALS**

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
  - 1. ClarkDietrich: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  - 2. SCAFCO Corporation: [www.scafco.com/#sle](http://www.scafco.com/#sle).
  - 3. CEMCO: [www.cemcosteel.com](http://www.cemcosteel.com).
  - 4. Steeler, Inc: [www.steeler.com](http://www.steeler.com).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.



- B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
  - 1. Studs: C-shaped with flat or formed webs..
    - a. Punched for utility access.
    - b. Widths as indicated in drawings.
  - 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.
- C. Non-structural Framing Accessories:
  - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
  - 2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
- D. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.
  - 1. Products:
    - a. USG Corporation; Drywall Suspension System: [www.usg.com/#sle](http://www.usg.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
  - 1. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 2. Georgia-Pacific Gypsum: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  - 3. National Gypsum Company: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
  - 4. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - 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, unless otherwise indicated.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 3. Type X board, UL or WH listed.
  - 4. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
    - b. Ceilings: 5/8 inch.
- C. Abuse Resistant Wallboard:
  - 1. Application: Corridor walls to 48 inches above floor.
  - 2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
  - 3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
  - 4. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
  - 5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 6. Paper-Faced Type: Gypsum wallboard, as defined in ASTM C1396/C1396M.
  - 7. Type: Fire-resistance-rated Type X, UL or WH listed.
  - 8. Thickness: 5/8 inch.
  - 9. Edges: Tapered.
- D. Backing Board For Wet Areas: One of the following products:
  - 1. Application: Surfaces behind tile in wet areas including Fiber Reinforced Panel Wainscot
  - 2. Application: Horizontal surfaces behind tile in wet areas including countertops and Fiber Reinforced Panel Wainscot.
  - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

4. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    - a. Thickness: 5/8 inch.
    - b. Products:
      - 1) National Gypsum Company; PermaBase Cement Board: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
      - 2) USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
      - 3) Substitutions: See Section 01 60 00 - Product Requirements.
  5. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
    - a. Thickness: 5/8 inch.
    - b. Products:
      - 1) James Hardie Building Products, Inc: [www.jameshardie.com/#sle](http://www.jameshardie.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  6. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
    - a. Regular Type: Thickness 5/8 inch.
- E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
  2. Thickness: 5/8 inch.
  3. Edges: Tapered.
  4. Products:
    - a. CertainTeed Corporation; Interior Ceiling Drywall: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - b. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
    - c. USG Corporation; 1/2 Inch Sheetrock Brand UltraLight Panels: [www.usg.com/#sle](http://www.usg.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.04 GYPSUM WALLBOARD ACCESSORIES**

- A. Acoustic Insulation: As specified in Section 07 21 00.
- 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.
- C. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
  1. Products:
    - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - b. Liquid Nails, a brand of PPG Architectural Coatings: [www.liquidnails.com/#sle](http://www.liquidnails.com/#sle).
    - c. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: [www.stifirestop.com/#sle](http://www.stifirestop.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Water-Resistive Barrier: As specified in Section 07 25 00.
- E. Beads and Other Trim: ASTM C1047, galvanized steel, unless noted otherwise.
  1. Corner Beads: Low profile, for 90 degree outside corners.
  2. L-Trim with Tear-Away Strip: Sized to fit 1/2 inch thick gypsum wallboard.
    - a. Products:
      - 1) Phillips Manufacturing Co; gripSTIK L-Tear: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).

- 2) Substitutions: See Section 01 60 00 - Product Requirements.
3. Wall Mounted Deflection Beads: Flexible gasket and bead with 1-1/8 inch flange.
  - a. Products:
    - 1) Trim-Tex, Inc: [www.trim-tex.com/#sle](http://www.trim-tex.com/#sle).
    - 2) Substitutions: See Section 01 60 00 - Product Requirements.
4. Expansion Joints:
  - a. Type: V-shaped metal with factory-installed protective tape.
  - b. Products:
    - 1) Phillips Manufacturing Co; 093 Expansion Control Joint: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).
    - 2) Substitutions: See Section 01 60 00 - Product Requirements.
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
  2. Products:
    - a. Continental Building Products: [www.continental-bp.com/#sle](http://www.continental-bp.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  3. Joint Compound: Drying type, vinyl-based, ready-mixed.
    - a. Products:
      - 1) CertainTeed Corporation; Extreme All-Purpose Joint Compound: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
- G. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- H. Primer: Flat latex basecoat paint-type product formulated to provide a prime coat over interior gypsum board prior to texture finish, similar to sheetrock "first coat". This prime coat does not replace the prime coat required for finish painting.
- I. Textured Finish Materials: Latex-based compound; plain.
  1. Products:
    - a. CertainTeed Corporation; Extreme Texture Coat/Acrylic Texture with M2Tech: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- J. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- K. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

#### **3.02 FRAMING INSTALLATION**

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
  1. Level ceiling system to a tolerance of 1/1200.
  2. Laterally brace entire suspension system.
  3. Install bracing as required at exterior locations to resist wind uplift.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

- D. Blocking: Install wood blocking for support of:
1. Framed openings.
  2. Wall-mounted cabinets.
  3. Plumbing fixtures.
  4. Toilet partitions.
  5. Toilet accessories.
  6. Wall-mounted door hardware.
  7. Chalkboards and marker boards
  8. Chalkboards and marker boards.
  9. 8Wall paneling, siding and trim.
  10. Mechanically attached signage.
  11. Projection screens and projectors.
  12. 1Miscellaneous wall-mounted equipment and accessories, including Owner furnished and/or Owner installed items.

### **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.
1. Place one bead continuously on substrate before installation of perimeter framing members.
  2. Place continuous bead at perimeter of each layer of gypsum board.
  3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### **3.04 BOARD INSTALLATION**

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- F. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.

### **3.05 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### **3.06 JOINT TREATMENT**

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
  - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 3. Level 3: Walls to receive textured wall finish.
  - 4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 5. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
  - 6. Level 0: Surfaces indicated to be finished in later stage of project.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

### **3.07 TEXTURE FINISH**

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

### **3.08 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

**END OF SECTION**

**SECTION 09 30 00  
TILING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Tile for wall applications.
- B. Cementitious backer board as tile substrate.
- C. Ceramic accessories.
- D. Non-ceramic trim.

**1.02 REFERENCE STANDARDS**

- A. 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 A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar 2019.
- C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation 2023.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. 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. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Tile: 1 percent of each size, color, and surface finish combination.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications:
  - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

**1.07 FIELD CONDITIONS**

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

**PART 2 PRODUCTS**

**2.01 TILE**

- A. Manufacturers: All products by the same manufacturer.
  - 1. Wall Tile Basis of Design: EmserTile Corporation: [www.daltile.com/#sle](http://www.daltile.com/#sle).

2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Natural Stone Tile:
  1. Single Tiles:
    - a. Size: 4 by 8 inch, nominal.
    - b. Thickness: 3/8 inch.
  2. Face: Natural fissured.
  3. Edges: Square.
  4. Color(s): Brazilian Black Slate.
  5. Coordinating Shapes: Liner.
  6. Products:
    - a. Dal-Tile Corporation: [www.daltile.com/#sle](http://www.daltile.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.02 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
- B. Non-Ceramic Trim: Brushed stainless steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
  1. Applications:
    - a. Open edges of wall tile.
    - b. Wall corners, outside and inside.
    - c. Floor to wall joints.
    - d. Borders and other trim as indicated on drawings.
  2. Manufacturers:
    - a. Schluter-Systems: [www.schluter.com/#sle](http://www.schluter.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.03 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
  1. ARDEX Engineered Cements; : [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  2. Bostik Inc: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  3. LATICRETE International, Inc: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  4. Merkrete, by Parex USA, Inc: [www.merkrete.com/#sle](http://www.merkrete.com/#sle).
- C. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
  1. Applications: Use this type of bond coat where indicated, and where no other type of bond coat is indicated.
  2. Products:
    - a. ARDEX Engineered Cements; ARDEX X 5: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
    - b. LATICRETE International, Inc; 257 TITANIUM: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
    - c. Merkrete, by Parex USA, Inc; Merkrete 735 Premium Flex: [www.merkrete.com/#sle](http://www.merkrete.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.04 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
  1. Applications: at all tile locations.
  2. Color(s): As selected by Architect from manufacturer's full line.
  3. Products:
    - a. ARDEX Engineered Cements; ARDEX WA: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
    - b. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).

- c. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
- d. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: [www.merkrete.com/#sle](http://www.merkrete.com/#sle).
- e. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.05 MAINTENANCE MATERIALS**

- A. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
  - 1. Composition: Water-based colorless silicone.

## **2.06 ACCESSORY MATERIALS**

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

#### **3.02 PREPARATION**

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler.

#### **3.03 INSTALLATION - GENERAL**

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Request tile pattern. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align wall joints.
- D. 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 square.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep control and expansion joints free of mortar, grout, and adhesive.
- J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

#### **3.04 INSTALLATION - WALL TILE**

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

#### **3.05 CLEANING**

- A. Clean tile and grout surfaces.

**END OF SECTION**



**SECTION 09 51 53**  
**DIRECT-APPLIED ACOUSTICAL CEILINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Acoustic units.
- B. Perimeter trim.

**1.02 REFERENCE STANDARDS**

- A. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2023.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on acoustic units and \_\_\_\_\_.
- C. Samples: Submit two samples, 6 by 6 inch in size, illustrating material and finish of acoustic units.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Direct Applied Acoustical Ceilings:
  - 1. Basis of Design: CertainTeed Corporation - Ecophon Focus SQ: [www.certainteed.com/#sle](http://www.certainteed.com/#sle) -
  - 2. Armstrong World Industries, Inc: [www.armstrong.com/#sle](http://www.armstrong.com/#sle).
  - 3. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 4. USG: [www.usg.com/#sle](http://www.usg.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Acoustic Tile: Mineral fiber, ASTM E1264.
  - 1. Size: 23.3 x 23.3 inches.
  - 2. Thickness: 3/4 inches.
  - 3. Joint: Rabbeted.
  - 4. Edge: Square.
  - 5. Surface Color: White.
  - 6. Surface Finish: Perforated .
- B. Attachment materials as required and recommended by manufacturer for installation method to match existing conditions.
- C. Perimeter Moldings: Rolled steel profile, white color.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

**3.02 INSTALLATION**

- A. Install system in accordance with manufacturer's instructions.

- B. Attachment as required and recommended by manufacturer for installation method and finish conditions to match existing ceiling.
- C. Perimeter Molding:
- D. Center tile on room axis leaving equal border units.
- E. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
- F. Install acoustic units level in uniform plane.

**3.03 TOLERANCES**

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

**END OF SECTION**

**SECTION 09 65 00  
RESILIENT FLOORING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Resilient sheet flooring.
- B. Resilient tile flooring.
- C. Resilient base.
- D. Installation accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

**1.03 REFERENCE STANDARDS**

- A. ASTM D6329 - Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers 1998 (Reapproved 2023).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source 2019a, with Editorial Revision (2020).
- C. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile 2020.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base 2021.
- E. ASTM F1913 - Standard Specification for Vinyl Sheet Floor Covering Without Backing 2019.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 2023.
- G. NSF 332 - Sustainability Assessment for Resilient Floor Coverings 2022.
- H. UL 2824 - GREENGUARD Certification Program Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chambers Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Do not double stack pallets.

**1.07 FIELD CONDITIONS**

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions

above 55 degrees F.

## **PART 2 PRODUCTS**

### **2.01 SHEET FLOORING**

- A. Vinyl Sheet Flooring - Type SV-1: Homogeneous without backing, with color and pattern throughout full thickness.
  - 1. Manufacturers:
    - a. Armstrong Flooring, Inc; Accolade Plus: [www.armstrongflooring.com/#sle](http://www.armstrongflooring.com/#sle).
    - b. Shannon Specialty Floors, Inc; TEKNOFLOR Medscapes HPD: [www.shannonspecialtyfloors.com/#sle](http://www.shannonspecialtyfloors.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1913.
  - 3. Thickness: 0.080 inch nominal.
  - 4. Integral coved base with cap strip.

### **2.02 TILE FLOORING**

- A. Vinyl Tile - LVT-1: Solid vinyl with color and pattern throughout thickness.
  - 1. Manufacturers:
    - a. Basis of Design: Mannington Commercial: Spacia Collection, 7.25 x 48 inch.
    - b. Armstrong Flooring Inc: [www.armstrong.com/#sle](http://www.armstrong.com/#sle).
    - c. Burke Flooring; Luxury Vinyl Tiles: [www.burkeflooring.com/#sle](http://www.burkeflooring.com/#sle).
    - d. Johnsonite, a Tarkett Company: [www.johnsonite.com/#sle](http://www.johnsonite.com/#sle).
    - e. Shannon Specialty Floors, Inc: [www.shannonspecialtyfloors.com/#sle](http://www.shannonspecialtyfloors.com/#sle).
    - f. TAJ Flooring: [www.tajflooring.com/#sle](http://www.tajflooring.com/#sle).
    - g. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
  - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
  - 4. Mold and Microbial Resistance: Highly resistant when tested in accordance with ASTM D6329; certified in accordance with UL 2824.
  - 5. VOC Content Limits: As specified in Section 01 61 16.
  - 6. NSF 332 Certification: Platinum level.
  - 7. Total Thickness: 0.125 inch.
  - 8. Color: As indicated on drawings.

### **2.03 RESILIENT BASE**

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; Style B, Cove.
  - 1. Manufacturers:
    - a. Basis of Design: Tarket/ Johnsonite, Baseworks with Toe: [www.johnsonite.com/#sle](http://www.johnsonite.com/#sle).
    - b. Burke Flooring: [www.burkeflooring.com/#sle](http://www.burkeflooring.com/#sle).
    - c. Roppe Corporation: [www.roppe.com/#sle](http://www.roppe.com/#sle).
    - d. Flexco: [www.flexcofloors.com](http://www.flexcofloors.com).
    - e. Mannington Commercial: [www.mannington.com](http://www.mannington.com).
    - f. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Height: 4 inch.
  - 3. Thickness: 0.125 inch.
  - 4. Finish: Satin.
  - 5. Color: To be selected by Architect from manufacturer's full range.

### **2.04 ACCESSORIES**

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

- C. Adhesive for Vinyl Flooring:
  - 1. As recommended by manufacturer.
- D. Moldings, Transition and Edge Strips: Same material as flooring.
- E. Filler for Coved Base: Plastic.
- F. Prefabricated Coved Base: Bonded Aluminum Reinforcing Backer.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
  - 1. Test in accordance with Section 09 05 61.
  - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
  - 3. Follow moisture and alkalinity remediation procedures in Section 09 05 61.
- D. Verify that required floor-mounted utilities are in correct location.

#### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.
- D. Clean substrate.

#### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.

#### **3.04 INSTALLATION - SHEET FLOORING**

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, and cover top edge with metal cap strip.

#### **3.05 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.

#### **3.06 INSTALLATION - RESILIENT BASE**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.

- D. Scribe and fit to door frames and other interruptions.

**3.07 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

**3.08 PROTECTION**

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

**END OF SECTION**

**SECTION 09 68 13  
TILE CARPETING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Carpet tile, loose laid with edges and control grid adhered.
- B. Walk-Off Mat Carpet Tile

**1.02 REFERENCE STANDARDS**

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials 2016 (Reapproved 2021).

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

**1.04 QUALITY ASSURANCE**

- A. 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. Tile Carpeting Acceptable Manufacturers:
  - 1. Interface, Inc: [www.interface.com/#sle](http://www.interface.com/#sle).
  - 2. Milliken & Company: [www.milliken.com/#sle](http://www.milliken.com/#sle).
  - 3. Mannington
  - 4. Collins & Aikman
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Tile Carpeting manufactured in one color dye lot.
  - 1. Product: Basis of Design -Shaw Contract, Shadows, Sketch Tile, 24 x 24 inches, color of 33327 Canopy.
  - 2. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
- B. Walk-Of Mat Carpet Tile
  - 1. Product: Basis of Design - Mannington Commercial, Charge 18" x 36".
    - a. Tile Size: 24 by 36 inch, nominal.
    - b. Color: As indicated on drawings.
    - c. Pattern: As indicated on drawings.

### **2.03 ACCESSORIES**

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Rubber, color as selected by Architect.
- C. Adhesives:
  - 1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
  - 1. Test in accordance with Section 09 05 61.
  - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

### **3.02 PREPARATION**

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

### **3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Adhere carpet tile to substrate along centerline of rooms, at perimeter of rooms, where tiles are cut, and at 15 foot intervals throughout rooms. Lay remainder of tile dry over substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

### **3.04 CLEANING**

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

**END OF SECTION**



**SECTION 09 90 00**  
**PAINTING AND COATING - K-12 EDUCATION FACILITY GUIDE SPECIFICATION - SHERWIN-**  
**WILLIAMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Interior painting and coating systems.
- C. Exterior painting and coating systems.
- D. Scope:
  - 1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
    - a. Exterior:
      - 1) Concrete: Cementitious siding, Flexboard, Transite, non-roof shingles, common brick, stucco, tilt-up concrete, precast, and cast-in-place concrete.
      - 2) Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, and other ferrous metal.
      - 3) Wood: Decks, exterior including pressure treated lumber, non-vehicular floors, and platforms.
      - 4) Architectural PVC, plastic, and fiberglass.
      - 5) Drywall: Gypsum board and exterior drywall.
    - b. Interior:
      - 1) Metal: Aluminum and galvanized.
      - 2) Metal, Galvanized: Ceilings and ductwork.
      - 3) Metal: Structural steel columns, joists, trusses, beams, miscellaneous and ornamental iron, structural iron, and other ferrous metal.
      - 4) Wood: Walls, ceilings, doors, and trim.
      - 5) Drywall: Walls, ceilings, gypsum board, and similar items.

**1.02 REFERENCE STANDARDS**

- A. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- B. SSPC-SP 6 - Commercial Blast Cleaning 2007.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design Products: Subject to compliance with requirements, provide Sherwin-Williams Company (The) products indicated; [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
- B. Comparable Products: Products of approved manufacturers will be considered in accordance with 01 60 00 - Product Requirements, and the following:
  - 1. Products that meet or exceed performance and physical characteristics of basis of design products.
  - 2. Other Acceptable Manufacturers:
    - a. Kelly-Moore Paints: [www.kellymoore.com/#sle](http://www.kellymoore.com/#sle).
    - b. PPG Paints: [www.ppgpaints.com/#sle](http://www.ppgpaints.com/#sle).
    - c. Rodda Paint Company: [www.rodmapaint.com/#sle](http://www.rodmapaint.com/#sle).
    - d. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
    - e. Miller Paint Company; [www.millerpaint.com](http://www.millerpaint.com)
    - f. Primer Sealers: Same manufacturer as top coats.

**2.02 PAINTINGS AND COATINGS**

- A. General:

1. Provide factory-mixed coatings unless otherwise indicated.
  2. Do not reduce, thin, or dilute coatings or add materials to coatings unless specifically indicated in manufacturer's instructions.
- B. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

### 2.03 PAINT SYSTEMS - EXTERIOR

- A. Concrete: Cementitious siding, Flexboard, Transite, non-roof shingles, common brick, stucco, tilt-up, precast, and poured-in-place cement.
1. Latex Systems:
    - a. Satin Finish:
      - 1) 1st Coat: Sherwin-Williams Loxon Concrete and Masonry Primer Sealer LX02W50: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).  
(a) 5.3 to 8 mils wet, 2.1 to 3.2 mils dry.
      - 2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).  
(a) 4 mils wet, 1.5 mils dry per coat.
- B. Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, ferrous metal.
1. Alkyd Systems, Water-Based:
    - a. Low Sheen Finish:
      - 1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).  
(a) 5 mils wet, 2 mils dry per coat.
      - 2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Low Sheen, B53-1250 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).  
(a) 4 to 5 mils wet, 1.4 to 1.7 mils dry per coat.
- C. Wood: Decks, exterior including pressure-treated lumber, non-vehicular floors and platforms.
1. Stain Systems:
    - a. Clear Stain:
      - 1) 1st and 2nd Coat: Sherwin-Williams SuperDeck Exterior Waterborne Clear Sealer, SD1T00100 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).  
(a) 150 to 300 sq ft/gal.
- D. Architectural PVC, plastic, and fiberglass.
1. Latex Systems:
    - a. Satin Finish:
      - 1) 1st Coat: Sherwin-Williams Extreme Bond Bonding Primer, B51W00150: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
      - 2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
- E. Drywall: Gypsum board and exterior drywall.
1. Latex Systems:
    - a. Satin Finish:
      - 1) 1st Coat: Sherwin-Williams Latex Wood Primer, B42W8041: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).  
(a) 4 mils wet, 1.4 mils dry per coat.
      - 2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).  
(a) 4 mils wet, 1.5 mils dry per coat.

### 2.04 PAINT SYSTEMS - INTERIOR

- A. Metal: Aluminum and galvanized.

1. Alkyd Systems, Water-Based:
  - a. Low Sheen Finish:
    - 1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
    - 2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Low Sheen, B53-1250 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
- B. Metal, Galvanized: Ceilings and ductwork.
  1. Dryfall Waterborne Topcoats:
    - a. Eg-Shel Finish:
      - 1) 1st and 2nd Coat: Sherwin-Williams Pro Industrial Waterborne Acrylic Dryfall, B42-82 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
- C. Metal: Structural steel columns, joists, trusses, beams, miscellaneous and ornamental iron, structural iron, and ferrous metal.
  1. Alkyd Systems, Water-Based:
    - a. Low Sheen Finish:
      - 1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
      - 2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Low Sheen, B53-1250 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
- D. Wood: Walls, ceilings, doors, and trim.
  1. Alkyd Systems, Water-Based:
    - a. Low Sheen Finish:
      - 1) 1st Coat: Sherwin-Williams Premium Wall and Wood Primer, B28W8111: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
      - 2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Low Sheen, B53-1250 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  2. Stain and Varnish System:
    - a. Satin Finish:
      - 1) 1st Coat: Sherwin-Williams Minwax Performance Series Tintable Wood Stain 250 VOC: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
      - 2) 2nd and 3rd Coat: Sherwin-Williams Minwax Waterbased Oil-Modified Polyurethane: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
- E. Drywall: Walls, ceilings, gypsum board, and similar items.
  1. Latex Systems:
    - a. Eg-Shel Finish:
      - 1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
      - 2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-2600 Series: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).

## **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.

### **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 mildew from impervious surfaces by scrubbing with solution of water and bleach. Rinse with clean water and allow surface to dry.
- D. Gypsum Board: Fill minor defects with filler compound; sand smooth and remove dust prior to painting.
- E. Aluminum: Remove surface contamination and oil; wash with solvent according to SSPC-SP 1.
- F. Galvanized Surfaces:
  - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- G. Ferrous Metal:
  - 1. Solvent clean according to SSPC-SP 1.
  - 2. Remove rust, loose mill scale, and other foreign substances using methods recommended by paint manufacturer and blast cleaning according to SSPC-SP 6. Protect from corrosion until coated.
- H. Wood: Remove dust, grit, and foreign matter. Scrape, sand, and spot prime knots and pitch streaks. Fill nail holes and imperfections with wood filler and sand smooth.

### **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.
- C. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

### **3.04 PRIMING**

- A. Apply primer to all surfaces unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.
- B. Primers specified in painting schedules may be omitted on items factory primed or factory finished items if acceptable to top coat manufacturers.

### **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 coatings from damage until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

**SECTION 10 14 00  
SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Room and door signs.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
  - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit one sample of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Package signs as required to prevent damage before installation.
- B. Store tape adhesive at normal room temperature.

**1.05 FIELD CONDITIONS**

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Flat Signs:
  - 1. Cosco Industries (ADA signs); ADA Series 1: [www.coscoarchitecturalsigns.com/#sle](http://www.coscoarchitecturalsigns.com/#sle).
  - 2. FASTSIGNS: [www.fastsigns.com/#sle](http://www.fastsigns.com/#sle).
  - 3. Mohawk Sign Systems, Inc: [www.mohawksign.com/#sle](http://www.mohawksign.com/#sle).
  - 4. Rixir Systems; [www.rixirsystems.com](http://www.rixirsystems.com)

**2.02 GENERAL**

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

### 2.03 INTERIOR SIGNAGE TYPES

- A. Interior Panel Signs - Room and Door Signs: Provide a sign for each door opening. Provide a sign next to each entry of open restrooms with no door.
  - 1. Sign Construction: Flat signs with sandblasted panel media as specified.
  - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
  - 3. Room numbers to be determined during submittal process. Room numbers shown on Drawings will not be used.
  - 4. Room Number Character Height: 1-1/2 inch.
  - 5. Room Name or Message Character Height: 3/4 inch.
  - 6. Symbol Height: 4 inches.
  - 7. Sign Sizes: As required for letters, numbers, and symbols and as indicated in Sign Type Drawings included at the end of this Section.
  - 8. Sign Types:
    - a. Sign Type A: Max Occupancy Sign.
    - b. Sign Type B: Room Sign with Room Name Only.
    - c. Sign Type C: Room Sign with Room Name and Room Number.
    - d. Sign Type H3: Restroom Sign, All Gender.
    - e. Sign Type J: Door Labeling.
    - f. Sign Type L: Door Labeling.
- B. Vinyl Lettering - Door Labeling for each door as required by Building Codes including Fire Alarm Control Panel.
  - 1. Provide individual plastic letters.
  - 2. Size: 2 inches tall.
  - 3. Color: Red or white, as selected by Architect.
  - 4. Copy: "FACP".
  - 5. Mounting: Peel and stick decals.
- C. Vinyl Lettering - Interior Graphic Identification Signage: Sign Type L. Provide where indicated on the interior elevations in the Drawings.
  - 1. Provide individual plastic letters and logo.
  - 2. Size: Varies, see interior elevations in Drawings for sizes.
  - 3. Color: As selected by Architect.
  - 4. Copy: Verify exact copy and logo design with Owner.
  - 5. Mounting: Peel and stick decals.

### 2.04 INTERIOR PANEL SIGNS - CONSTRUCTION

- A. Interior Panel - Flat Signs: Tactile signage media without frame, unless indicated otherwise in Sign Type Drawings.
- B.
  - 1. Edges: Square.
    - 1. Corners: Square.
  - 2. Wall Mounting of One-Sided Signs: Tape and Adhesive. For concrete or masonry substrates, mount with tamper-proof fasteners per manufacturer.
  - 3. Mounting of One-Sided Signs on Glass: Adhesive tape, with matching backer plaque.
- C. Color and Font: Unless otherwise indicated:
  - 1. Character Font: Mr Eaves XL MOD OT REGULAR.
  - 2. Character Case: Upper case only.
  - 3. Background Color: As selected by Architect from Manufacturer's standard colors.
  - 4. Character Color: Contrasting color, as selected by Architect from Manufacturer's standard colors.

### 2.05 TACTILE SIGNAGE MEDIA

- A. Sandblasted Panels: Hard phenolic resin core with plastic laminate surface. Sand blasted graphic process, allowing the text and braille to be an intrinsic part of the sign.

1. Sign Panel Thickness: 1/8 inch.
2. Glue-on letters or etched backgrounds are not acceptable.
3. 3. All text to be accompanied by Grade II braille. Braille to be placed below the corresponding text, leaving 1/2 inch clear between text and braille. Grade II braille translations to be provided by signage manufacturer.

#### **2.06 2.06 NON-TACTILE SIGNAGE MEDIA**

- A. Silk Screened Plastic Panels: Letters and graphics silk screened onto reverse side of plastic surface:
  1. Sign Color: Clear.
  2. Total Thickness: 1/8 inch.

#### **2.07 ACCESSORIES**

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Exposed Screws: Chrome plated.
- C. Tape Adhesive: Vinyl tape and silastic adhesive unless otherwise indicated. Installations at glass to use double-sided adhesive tape.

### **PART 3 EXECUTION**

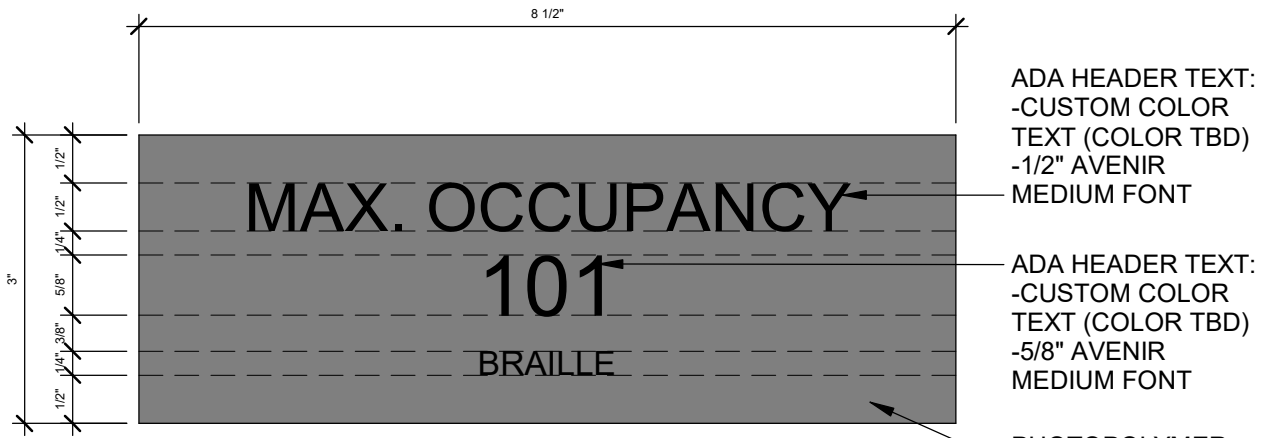
#### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.

#### **3.02 INSTALLATION**

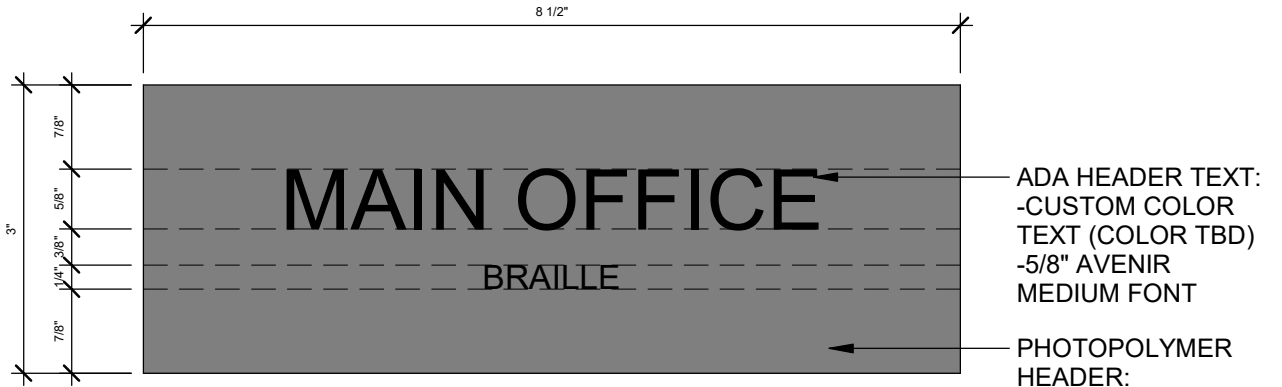
- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs as scheduled and where indicated:
  1. Mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
  2. Room and Door Signs: Unless otherwise indicated in Drawings, locate on wall at latch side of door, 2 inches from door frame with centerline of sign at 48 - 60 inches above finished floor. Signs with Braille to be mounted between 48 inches minimum and 60 inches maximum to the baseline of the braille cells.
  3. Where sign is not adjacent to a door, locate sign per the Drawings. If exact location not indicated, confirm location and mounting height with Architect.
  4. Installations at glass to use double-sided adhesive tape with matching backer plaque.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

**END OF SECTION**



SIGN TYPE A:  
MAX. OCCUPANCY SIGN

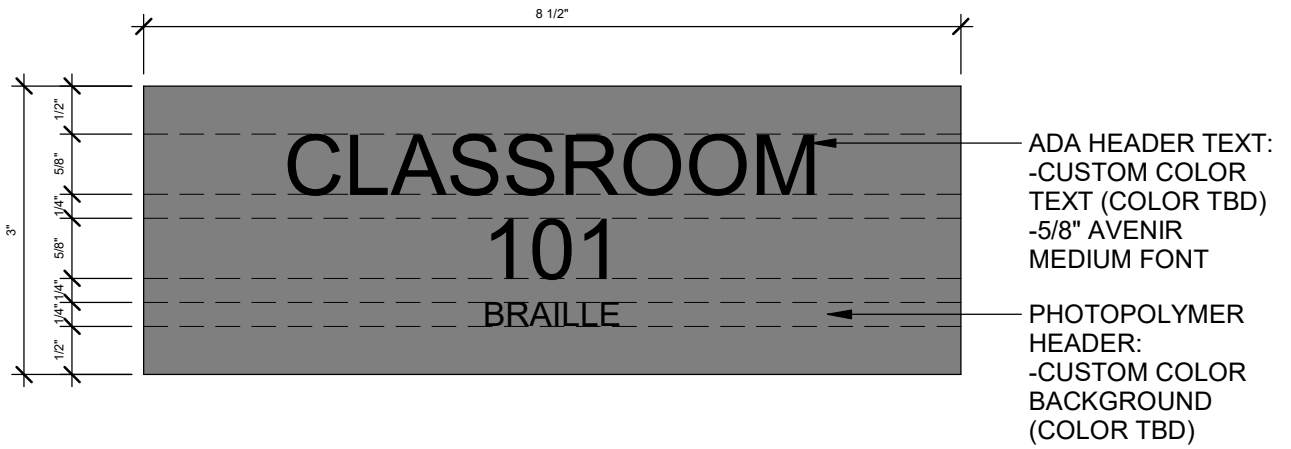




ADA HEADER TEXT:  
 -CUSTOM COLOR  
 TEXT (COLOR TBD)  
 -5/8" AVENIR  
 MEDIUM FONT

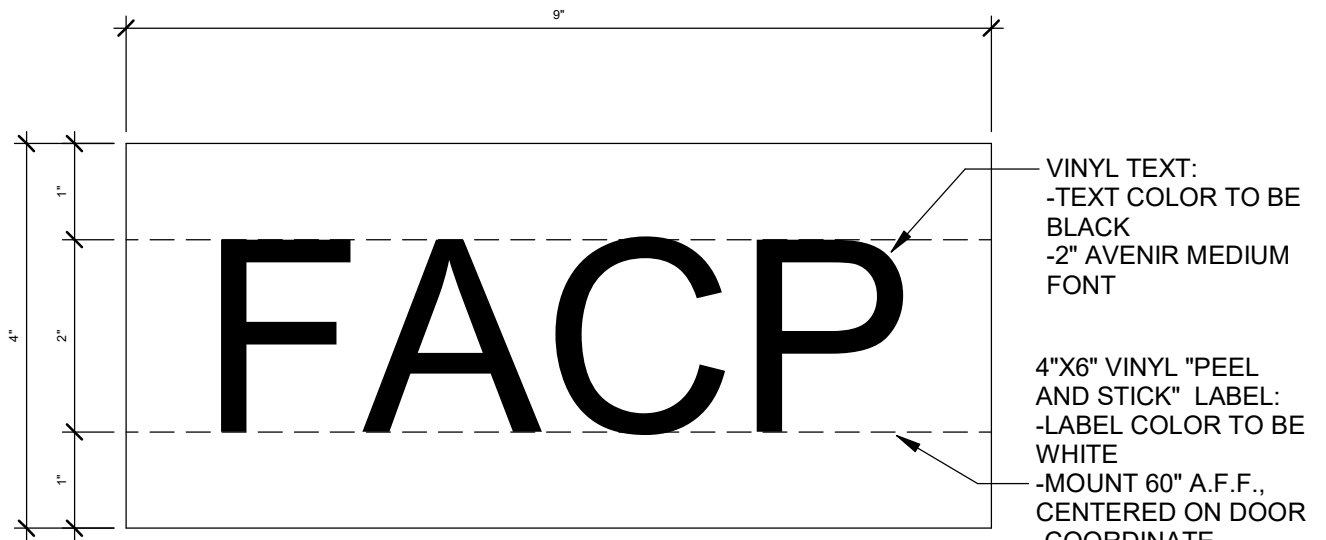
PHOTOPOLYMER  
 HEADER:  
 -CUSTOM COLOR  
 BACKGROUND  
 (COLOR TBD)

**SIGN TYPE B:  
 ROOM SIGN  
 WITH ROOM NAME ONLY**



SIGN TYPE C:  
ROOM SIGN WITH  
ROOM NAME AND  
ROOM NUMBER





SIGN TYPE L:  
DOOR LABELING

**SECTION 10 14 19  
DIMENSIONAL LETTER SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Dimensional letter signage.
- B. Illumination system.

**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 01 30 00 - 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.
- 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. Selection Samples: Where materials, colors, and finishes are not specified, submit two sets of selection charts or chips.

**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 dimensional letter signs as required to prevent damage before installation.
- B. Store under cover and elevated above grade.

**1.06 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](http://www.fastsigns.com/#sle).
  - 2. Inpro Corporation: [www.inprocorp.com/#sle](http://www.inprocorp.com/#sle).
  - 3. Substitutions: See Section 01 60 00 - 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.
  2. Mounting Location: Exterior as indicated on drawings.
  3. Allow for total of 50 letters, 6 inches high.
- B. Metal Letters:
1. Material: Stainless steel sheet, formed.
  2. Thickness: 1/8 inch minimum.
  3. Letter Height: 12" inches.
  4. Text and Typeface:
    - a. Character Font: Helvetica, Arial, or other sans serif font.
  5. Finish: Brushed, satin.
  6. Color: As selected.
  7. Mounting: Concealed or exposed screws.

#### **2.04 ACCESSORIES**

- A. Concealed Screws: Noncorroding metal; stainless steel.
- B. Exposed Screws: Stainless steel.

### **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. 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 10 26 00  
WALL AND DOOR PROTECTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Corner guards.

**1.02 REFERENCE STANDARDS**

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- C. Shop Drawings: Include plans, elevation, sections, and attachment details.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Corner Guards:
  - 1. Babcock-Davis; Stainless steel: [www.babcockdavis.com/#sle](http://www.babcockdavis.com/#sle).
  - 2. Construction Specialties, Inc; Stainless Steel: [www.c-sgroup.com/#sle](http://www.c-sgroup.com/#sle).
  - 3. Inpro: [www.inprocorp.com/#sle](http://www.inprocorp.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 PRODUCT TYPES**

- A. Corner Guards - Surface Mounted:
  - 1. Material: Type 304 stainless steel, No. 4 finish.
  - 2. Width of Wings: 2 inches.
  - 3. Corner: Square.
  - 4. Color: As indicated.
  - 5. Projection From Wall to Outside of Guard: 2 inch.
  - 6. Length: 42 inches

**2.03 FABRICATION**

- A. Fabricate components with tight joints, corners and seams.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

**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 above finished floor.
- C. Locate at all outside corners of gypsum board walls. And additionally as indicated on drawings.

**END OF SECTION**

**SECTION 10 28 00**  
**TOILET, BATH, AND LAUNDRY ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Commercial toilet accessories.
- B. Under-lavatory pipe supply covers.
- C. Utility room accessories.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures 2011 (Reaffirmed 2022).
- C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 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 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- 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 C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping 2021.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- J. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Commercial Toilet, Shower, and Bath Accessories:
  - 1. American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
  - 2. Bradley Corporation: [www.bradleycorp.com/#sle](http://www.bradleycorp.com/#sle).
  - 3. Bobrick Washroom Accessories: [www.bobrick.com](http://www.bobrick.com)
- B. Under-Lavatory Pipe Supply Covers:
  - 1. Plumberex Specialty Products, Inc: [www.plumberex.com/#sle](http://www.plumberex.com/#sle).
  - 2. Substitutions: Section 01 60 00 - Product Requirements.



## 2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide 3 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- F. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- G. Adhesive: Two component epoxy type, waterproof.
- H. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

## 2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Back paint components where contact is made with building finishes to prevent electrolysis.

## 2.04 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, (OFCl).
  - 1. Products:
    - a. Georgia-Pacific.
- B. Paper Towel Dispenser: (OFCl) Manual, roll paper type.
  - 1. Cover: Stainless steel.
  - 2. Paper Discharge: Manual dispense by lever operation.
  - 3. Capacity: 6-inch diameter roll.
  - 4. Mounting: Surface mounted.
  - 5. Refill Indicator: Transparent viewing slot.
  - 6. Products:
    - a. Georgia-Pacific.
- C. Waste Receptacle: (OFCl) Stainless steel, freestanding style with swing top.
  - 1. Products:
    - a. Bobrick.
- D. Soap Dispenser: (OFCl) Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.
  - 1. Products:
    - a. Bobrick.
- E. Seat Cover Dispenser: (OFCl) Stainless steel, surface-mounted, reloading by concealed opening at base, tumbler lock.
  - 1. Products:
    - a. Bobrick.
- F. Grab Bars: Stainless steel, peened surface.
  - 1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force, minimum.
    - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
    - c. Finish: Satin.
    - d. Length and Configuration: As indicated on drawings.
    - e. Products:

- 1) AJW Architectural Products: [www.ajw.com/#sle](http://www.ajw.com/#sle).
- 2) Bradley Corporation: [www.bradleycorp.com/#sle](http://www.bradleycorp.com/#sle).
- 3) American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).

- G. Combination Sanitary Napkin/Tampon Dispenser: (OFCl) Stainless steel, surface-mounted.
1. Products:
    - a. Bobrick.

## **2.05 UNDER-LAVATORY PIPE AND SUPPLY COVERS**

- A. Under-Lavatory Pipe and Supply Covers:
1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
  2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
  3. Construction: 1/8 inch flexible PVC.
    - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
    - b. Comply with ASTM C1822, type indicated.
    - c. Comply with ASME A112.18.9.
    - d. Comply with ICC A117.1.
    - e. Microbial and Fungal Resistance: Comply with ASTM G21.
  4. Color: White.
  5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.
  6. Products:
    - a. Plumberex Specialty Products, Inc; Plumberex Handy-Shield Maxx: [www.plumberex.com/#sle](http://www.plumberex.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.06 UTILITY ROOM ACCESSORIES**

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
1. Drying rod: Stainless steel, 1/4 inch diameter.
  2. Hooks: 4, 0.06 inch stainless steel rag hooks at shelf front.
  3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
  4. Length: Manufacturer's standard length for number of holders/hooks.
  5. Products:
    - a. Bobrick B239.
    - b. Substitutions: 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.
- D. See Section 06 10 00 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

### **3.02 PREPARATION**

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

### **3.03 INSTALLATION**

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

**3.04 PROTECTION**

- A. Protect installed accessories from damage due to subsequent construction operations.

**END OF SECTION**

**SECTION 10 31 00  
MANUFACTURED FIREPLACES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electric fireplaces.

**1.02 ABBREVIATIONS AND ACRONYMS**

**1.03 DEFINITIONS**

**1.04 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL (DIR) - Online Certifications Directory Current Edition.
- C. UL 2021 - Fixed and Location Dedicated Electric Room Heaters Current Edition, Including All Revisions.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide firebox cabinet dimensions, clearances required from adjacent dissimilar construction, applicable regulatory agency approvals, and electrical characteristics of fan.
- C. Shop Drawings: Indicate layout, elevations, sections, firebox rough opening dimensions, rough opening sizes for chimney flue, required clearances, utility service requirements, attachments to other work, and fan size.
- D. Manufacturer's Certificate: Certify fireplace components meet or exceed UL (DIR) requirements.
- E. Manufacturer's Instructions: Indicate installation procedures and component installation sequence, clearances and tolerances from adjacent construction.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

**PART 2 PRODUCTS**

**2.01 ELECTRIC FIREPLACES**

- A. Manufacturers:
  - 1. Amantii Electric Fireplaces: [www.amantii.com/#sle](http://www.amantii.com/#sle).
  - 2. Dimplex; Opti-Myst Pro 1500 Double Sided in Wall - GBF 1500-GLASS: [www.dimplex.glendimplexamericas.com/#sle](http://www.dimplex.glendimplexamericas.com/#sle).
  - 3. FPI Fireplace Products International, Inc: [www.regency-fire.com/#sle](http://www.regency-fire.com/#sle).
  - 4. Modern Flames, LLC: [www.modernflames.com/#sle](http://www.modernflames.com/#sle).
  - 5. Napoleon: [www.napoleon.com/#sle](http://www.napoleon.com/#sle).
  - 6. Planika USA LLC: [www.planikausa.com/#sle](http://www.planikausa.com/#sle).
  - 7. SimpliFire: [www.simplifire.com/#sle](http://www.simplifire.com/#sle).
  - 8. Superior Fireplaces: [www.superiorfireplaces.us.com/#sle](http://www.superiorfireplaces.us.com/#sle).
  - 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description:

1. Basis of Design: Dimplex; Opti-Myst Pro 1500 Double Sided in Wall:  
[www.dimplex.glendimplexamericas.com/#sle](http://www.dimplex.glendimplexamericas.com/#sle).
  - a. Location: Indoor.
  - b. Fireplace Style: Traditional.
  - c. Power Connection: Hardwired.
  - d. Built-in fireboxes.
- C. Design Criteria:
  1. Comply with UL 2021 for electric room heating equipment.

## **2.02 REGULATORY REQUIREMENTS - GENERAL**

- A. Products Requiring Electrical Connection: Listed and labeled by UL (DIR) or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified and indicated.

## **2.03 COMPONENTS**

- A. Firebox: Formed insulated steel cabinet with rectangular-shaped interior, configured to include
  1. Viewable Opening: Two sided view from front and back, 48 inches wide by 36 inches high.
- B. Exposed Cladding: Cast iron.

## **2.04 ACCESSORIES**

- A. Include all manufacturers recommended accessories and black steel trim for in wall installation with double sided view.
  1. Log Kit CDFI 1500-DWSKIT

## **PART 3 EXECUTION**

### **3.01 VERIFICATION OF CONDITIONS**

- A. Verify prepared openings are ready to receive work and opening dimensions are as indicated on drawings.
- B. Verify proper power supply and fuel source are available.

### **3.02 INSTALLATION**

- A. Comply with applicable code for clearances from adjacent materials, chimney height above roof line requirements, and unit UL approval.
- B. Perform electrical work in accordance with NFPA 70.
- C. Install unit assembly in accordance with manufacturer's instructions.
- D. Install chimney plumb through prepared openings using fire-stop spacers.
- E. Carefully cut holes for fan wall switch and grilles.

**END OF SECTION**

**SECTION 10 41 16  
EMERGENCY KEY CABINETS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Emergency Key Cabinets.

**1.02 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2014.
- B. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Contractor to contact the Authority Having Jurisdiction and/or the Fire Chief of the Fire District in which the project is located. The Fire Chief will furnish signed authorization forms for ordering the rapid entry key vault.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's data showing sizes, standard rough-in requirements and materials.

**PART 2 PRODUCTS**

**2.01 EMERGENCY KEY CABINET**

- A. Basis of Design Manufacturer: Knox Company: [www.knoxbox.com](http://www.knoxbox.com).
- B. Description: High security, weather resistant, rapid entry key box.
  - 1. Model: 3200 Series KNOX BOX - Hinged Door Model.
  - 2. Mounting: Recessed where located on building.
  - 3. Mounting: Surface mounted where installed on fence post.
  - 4. Capacity: Holds up to 10 keys and access cards in interior compartment.
  - 5. Composition: Factory finished steel housing.
  - 6. Size: 5 inches x 4 inches x 3 inches deep.
  - 7. Color: To be selected by Architect from standard range.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verification of Conditions: Verify that conditions are suitable for installation per manufacturers instructions.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's written instructions.
- B. Install backing to provide a secure installation.
- C. Verify exact mounting location with the Authority Having Jurisdiction and/or the Fire Chief prior to rough-in.
- D. Where installed in masonry, coordinate exact location with mason.

**3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

**3.04 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals for additional submittals.

**END OF SECTION**

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**SECTION 10 44 00  
FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 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.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fire Extinguishers:
  - 1. Larsen's Manufacturing Co;[MP & WC Series]: [www.larsensmfg.com/#sle](http://www.larsensmfg.com/#sle).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
  - 1. Larsen's Manufacturing Co; 2409 Model: [www.larsensmfg.com/#sle](http://www.larsensmfg.com/#sle).
  - 2. Substitutions: See Section 01 60 00 - 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. Class: A:B:C type.
  - 2. Size and classification as scheduled.
  - 3. Finish: Baked polyester powder coat, color as selected.
  - 4. Temperature range: Minus 40 degrees F to 120 degrees F.

**2.03 FIRE EXTINGUISHER CABINETS**

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Cabinet Construction: Non-fire rated.
  - 1. Formed primed steel sheet; 0.036 inch thick base metal.
- C. Fire Rated Cabinet Construction: One-hour fire rated.
- D. Cabinet Configuration: Semi-recessed type.



1. Trim: Flat square edge, with \_\_\_\_ inch wide face.
  2. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- E. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.
- F. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Fabrication: Weld, fill, and grind components smooth.
- I. Finish of Cabinet Exterior Trim and Door: Red baked enamel.
- 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, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 48 inches maximum from finished floor to latch .
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets and on wall brackets.

#### **3.03 MAINTENANCE - SELF-SERVICE FIRE EXTINGUISHERS**

- A. Monthly Inspections: Inspect self-service fire extinguishers on monthly basis in accordance with manufacturer's instructions, and requirements of the authorities having jurisdiction (AHJ).
- B. Annual Inspections: Inspect self-service fire extinguishers on annual basis in accordance with manufacturer's instructions, and requirements of the authorities having jurisdiction (AHJ).
- C. Inspection Certification Tag: Provide new tag indicating acceptable condition of fire extinguisher, date of inspection, and name of self-service inspector for each inspection.

#### **3.04 SCHEDULES**

- A. For all areas where designated "FEC" on Drawings, unless noted otherwise below: Provide Dry Chemical Type 3A:40B:C, 5 lb capacity. Place in Semi-Recessed Cabinet for Typical Low-Hazard Fire Extinguisher. Service Bay areas to receive wall mounted extinguisher on bracket installation.

**END OF SECTION**

**SECTION 12 24 00  
WINDOW SHADES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Interior manual roller shades.
- B. Interior motorized roller shades.

**1.02 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2023, with Errata.
- C. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.
- D. WCMA A100.1 - Standard for Safety of Window Covering Products 2022.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of affected installers.
- B. Sequencing:
  - 1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
  - 2. Do not install shades until final surface finishes and painting are complete.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
  - 1. Motorized Shades: Include power requirements and standard wiring diagrams for specified products.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details and head, jamb and sill details.
  - 1. Motorized Shades: Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.
- D. Selection Samples: Include fabric samples in full range of available colors and patterns.
  - 1. Motorized Shades: Include finish selections for controls.
- E. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of this type with minimum 5 years of documented experience with shading systems of similar size and type.
  - 1. Factory training and demonstrated experience.

**1.06 MOCK-UP**

- A. Mock-Up: Provide full size mock-up of window shade system complete with selected shade fabric including example of seams and batten pockets when applicable.
  - 1. Obtain Architect's approval of light and privacy characteristics of fabric prior to fabrication.
  - 2. Full-sized mock-up may become part of the final installation.

### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

### 1.08 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Interior Manually Operated Roller Shades:
  - 1. MechoShade Systems LLC; Mecho/5 System: [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).
- B. Interior Motorized Roller Shades, Motors and Motor Controls:
  - 1. MechoShade Systems LLC; UrbanShade Single Roller - Motorized: [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

### 2.02 ROLLER SHADES

- A. General:
  - 1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
  - 2. Provide shade system that operates smoothly when shades are raised or lowered.
  - 3. Motorized Shades: Motor system housed inside roller tube, controlling shade movement via motor controls indicated; listed or recognized to UL 325.
    - a. Comply with NFPA 70.
    - b. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Where applicable, system components to be FCC compliant.
    - c. Motors: Size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated; integrated into shade operating components and concealed from view; fully compatible with controls to be installed.
- B. Roller Shades:
  - 1. Basis of Design: Mecho/5x Manual Shade System.
  - 2. Description - Interior Roller Shades: Single roller, Manual operated at low locations and Motor operated at high locations fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
    - a. Drop Position: Regular roll.
    - b. Roll Direction: Roll down, closed position is at window sill.
    - c. Roll Direction: Bottom-up, closed position is at top of window opening.
    - d. Mounting: Window jamb mounted - inside, between jambs.
    - e. Size: As indicated on drawings.
    - f. Fabric: SoHo Collection 1100 Series (1% open).
  - 3. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
  - 4. Roller Tubes: As required for type of shade operation.
    - a. Material: Extruded aluminum, clear anodized finish.
    - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
    - c. Take-Up Roller: Manufacturer's standard roller tube pretensioned for winding lift cable in bottom-up type shades.
  - 5. Hembars: Designed to maintain bottom of shade straight and flat.

- a. Style: Exposed aluminum bottom bar, flat profile with closed ends; baked enamel finish, color to match shade fabric.
6. Manual Operation for Interior Shades at a height easily accessible from floor level:
  - a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
  - b. Drive Chain: Continuous loop beaded ball chain, 95 pounds minimum breaking strength. Provide upper and lower limit stops.
  - c. Chain Retainer:
    - 1) Manufacturer's standard clip.
- C. Roller Shades - Basis of Design: MechoShade Systems LLC; Mecho/5 System; [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).
  1. Description: Single roller, manually operated fabric window shades.
    - a. Drop Position: Regular roll.
    - b. Mounting: Window jamb mounted.
    - c. Size: As indicated on drawings.
    - d. Fabric: SoHo Collection 1100 Series (1% open)
  2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
  3. Roller Tubes:
    - a. Material: Extruded aluminum.
    - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
    - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
    - d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
  4. Hembars: Designed to maintain bottom of shade straight and flat.
    - a. Style: Exposed aluminum bottom bar with matching finials, rectangular profile.
      - 1) Color: Manufacturer's standard color coordinated with shade fabric selected.
  5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
    - a. Provide a permanently lubricated brake assembly mounted on an oil-impregnated hub with wrapped spring clutch.
    - b. Brake must withstand minimum pull force of 50 pounds in the stopped position.
    - c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
  6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pound minimum breaking strength. Provide upper and lower limit stops.
    - a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
  7. Accessories:
    - a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; clear anodized finish.
      - 1) Color: Black.
      - 2) Profile: Square.
    - b. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

### 2.03 SHADE FABRIC

- A. Fabric: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
  1. Manufacturers:
    - a. MechoShade Systems LLC; Soho - 1100 Series (1% open): [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).

- b. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. Material: Vinyl coated polyester.
- 3. Performance Requirements:
  - a. Flammability: Pass NFPA 701 large and small tests.
- 4. Color: As selected by Architect from manufacturer's full range of colors.

#### **2.04 ROLLER SHADE FABRICATION**

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: As recommended in writing by manufacturer.
- C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. Start of installation shall be considered acceptance of substrates.

#### **3.02 PREPARATION**

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- B. Coordinate with window installation and placement of concealed blocking to support shades.

#### **3.03 INSTALLATION**

- A. Install shades at all windows and relite locations except for the North exterior gable end wall upper window units with the sloped heads while providing shades for the lower units allowing horizontal head application.
- B. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- C. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
- D. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

#### **3.04 SYSTEM STARTUP**

- A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

#### **3.05 CLEANING**

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

#### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

#### **3.07 PROTECTION**

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

**END OF SECTION**

**SECTION 12 32 00  
MANUFACTURED WOOD CASEWORK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured standard and custom casework, with cabinet hardware.
- B. Mobile cabinets.

**1.02 DEFINITIONS**

- A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.
- B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.
- C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

**1.03 REFERENCE STANDARDS**

- A. AWI (QCP) - Quality Certification Program Current Edition.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
- C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances, clearances required, and keying information.
- D. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches.
  - 1. Plastic laminate samples, for color, texture, and finish selection.
- E. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- F. Finish touch-up kit for each type and color of materials provided.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
  - 1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
  - 2. This AWI (QCP) project is registered as project number \_\_\_\_\_.
  - 3. Provide designated labels on shop drawings as required by certification program.
  - 4. Provide designated labels on installed products as required by certification program.

5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
  6. Replace, repair, or rework all work for which certification is refused.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
- B. Acceptance at Site:
1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.
- C. Storage:
1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Plastic Laminate Casework:
1. Burgeners Wood Working: [www.burgenerswoodworking.com](http://www.burgenerswoodworking.com)
  2. Cascade Casework: [www.cascadecasework.com](http://www.cascadecasework.com)
  3. Hayes Cabinets: [www.hayescabinets.com](http://www.hayescabinets.com)
  4. Westmark Products, Inc: [www.westmarkproducts.com](http://www.westmarkproducts.com)
  5. Pacific Cabinets Inc.: [www.pacificcabinets.com](http://www.pacificcabinets.com).
  6. Diversified Casework; [www.diversifiedcasework.com](http://www.diversifiedcasework.com).
  7. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 CASEWORK, GENERAL**

- A. Quality Standard: AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom Grade.

### **2.03 FABRICATION**

- A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
- B. Construction: As required for selected grade.
- C. Structural Performance: Safely support the following minimum loads:
1. Base Units: 500 pounds per linear foot across the cabinet ends.
  2. Suspended Units: 300 pounds static load.
  3. Drawers: 125 pounds, minimum.
  4. Hanging Wall Cases: 300 pounds.
  5. Shelves: 100 pounds, minimum.
- D. Seismic Performance: Casework, including attachments to other work, able to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Component Importance Factor: 1.0.
- E. Fittings and Fixture Locations: Cut and drill components for fittings and fixtures.
- F. Access Panels: Where indicated, for maintenance of utility service and mechanical and electrical components.

- G. Removable back panels on all base cabinets. Provide partial height back panels at sink cabinets.
- H. Fixed panels at backs of open spaces between base cabinets.
- I. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- J. Mobile Cabinets: Same construction as fixed base cabinets, with modifications.
  - 1. Toe kick space eliminated.
  - 2. Cabinet underside reinforced as is standard with the manufacturer to provide caster mounting points.
  - 3. Four casters, each with a load rating of 165 pounds.
  - 4. For cabinets with drawers, include a counterweight to prevent the cabinet from tipping when one drawer is opened.
    - a. Rate drawers at 50 pounds maximum.

#### **2.04 PLASTIC-LAMINATE-CLAD CASEWORK**

- A. Description: Factory fabricated modular casework, surfaces clad with plastic laminate.
  - 1. Quality Grade: Provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards (AWS) for Custom Grade, except where more stringent requirements are indicated in this Section.
  - 2. Style: Reveal overlay with PVC edge banding.
- B. Cabinet Body Construction: Cabinet components to be fabricated with balanced construction and neatly assembled with a combination of tongue and groove joinery, wood dowels, adhesive, screws and other fasteners. Complete cabinets to be square, plumb and true.
  - 1. Core Materials: Particleboard, solid wood stock, plywood, or medium density fiberboard or combination thereof.
  - 2. Cabinet Bases: 4 inch standard height, 3/4 inch thick exterior grade plywood base in continuous lengths to ensure casework is installed straight, level and true.
  - 3. Cabinet Tops and Bottoms: At semi-exposed cabinet tops and bottoms, 3/4 inch thick particleboard core clad on both faces with thermally fused melamine laminate. At exposed tops and bottoms, 11/16 inch thick particleboard core clad on both faces with high pressure decorative laminate. PVC edge banding at front edge.
  - 4. Cabinet Ends: At semi-exposed cabinets ends, 3/4 inch thick particleboard core clad on both faces with thermally fused melamine laminate. At exposed cabinet ends, 11/16 inch thick particleboard core clad on both faces with high pressure decorative laminate. PVC edge banding at front edge. Drill ends with 5mm diameter holes at 32mm on center for adjustable shelf supports.
  - 5. Cabinet Backs: At semi-exposed cabinet backs, 1/2 inch thick particleboard with factory-applied coating on both faces. At cabinet backs in open cabinets, 7/16 inch thick particleboard core clad with high pressure decorative laminate. At freestanding cabinets where rear is exposed to view, 11/16 inch particleboard core clad with high pressure decorative laminate. At upper units, provide PVC edge banding at exposed edges.
  - 6. Doors: 11/16 inch thick particleboard core, clad on both faces with high pressure decorative laminate, PVC edge banding at all edges. Provide rubber bumper silencers for quiet operation.
    - a. Minimum Quantity of Hinges:
      - 1) Doors up to 48 inches tall: 2 hinges per door.
      - 2) Doors over 48 inches tall and up to 84 inches tall: 3 hinges per door.
      - 3) Doors over 84 inches tall and up to 90 inches tall: 4 hinges per door.
  - 7. Drawers: Mounted on roller guides, with positive 'in and 'out' stop. Provide rubber bumper silencers for quiet operation. Where individual locked drawers are required, provide full depth security panels between drawers.



- a. Drawer Fronts: 11/16 inch thick particleboard core clad on both faces with high pressure decorative laminate. PVC edge banding at all edges. Drawer fronts attached to sub-fronts with screw attachment.
  - b. Drawer Sides: 1/2 inch thick particleboard core clad on both faces with thermally fused melamine laminate. PVC edge banding at top edges.
  - c. Drawer Bottoms, Sub-Front and Backs: 1/2 thick particleboard with factory applied coating on both faces. Bottoms to be tongued into sides, back, and sub-front; glued and clamped.
8. Shelving: Fixed and adjustable shelving to be designed to support up to 50 lbs. per sf uniform loading with no more than L/144 inch deflection. Shelves inside closed cabinets to be clad on both faces with thermally fused melamine laminate. Shelves at open units to be clad on both faces with high pressure decorative laminate. PVC edge banding at exposed edges.
- a. Minimum Shelving Thickness:
    - 1) Spans up to 31 inch long: 3/4 inch particleboard.
    - 2) Spans over 31 inch and up to 41 inch long: 1 inch thick particleboard.
    - 3) Spans over 41 inch and up to 48 inch long: 1 inch thick plywood.
    - 4) Spans over 48 inch: Not permitted.
  - b. Quantity of Shelves per Unit:
    - 1) Base Cabinets / Tall Cabinets:
      - (a) Units up to 36 inches tall: 1 shelf per unit.
      - (b) Units over 36 inches and up to 48 inches tall: 2 shelves per unit.
      - (c) Units over 48 inches and up to 60 inches tall: 3 shelves per unit.
      - (d) Units over 60 inches and up to 72 inches tall: 4 shelves per unit.
      - (e) Units over 72 inches and up to 84 inches tall: 5 shelves per unit.
      - (f) Units over 84 inches and up to 96 inches tall: 6 shelves per unit.
    - 2) Upper Cabinets:
      - (a) Units up to 24 inches tall: None.
      - (b) Units over 24 inches and up to 30 inches tall: 1 shelf per unit.
      - (c) Units over 30 inches and up to 36 inches tall: 2 shelves per unit.
      - (d) Units over 36 inches and up to 40 inches tall: 3 shelves per unit.
9. Fixture Locations: Cut and drill counter tops, backs, and other components for service outlets and fixtures.
10. Access Panels: Provide access panels for maintenance of utility service and mechanical and electrical components.
11. Scribes and Fillers: Where cabinets do not fit tight to adjacent construction, provide filler panels of matching construction and finish.
12. Locks: Provide locks where indicated on the Drawings.
13. 13Plastic Laminate Cladding: NEMA LD 3, type as specified. Bonded to substrate with contact cement.
- a. Exposed Surfaces: High-pressure decorative laminate (HPDL), VGS, 0.028 inch nominal thickness; satin finish.
    - 1) Color(s): To be selected by Architect from laminate manufacturer's full range of solid colors and patterns. Refer to Drawings for quantity of colors required.
  - b. Semi-Exposed Surfaces: Unless noted otherwise, thermally fused melamine laminate (TFM), 0.020 inch nominal thickness; satin finish.
    - 1) Color: Casework manufacturer's standard almond, grey or white.
  - c. Semi-Exposed Surfaces: At interior faces of cabinet doors, interior faces of drawers and interior faces of exposed cabinet ends, provide high-pressure decorative laminate (HPDL), VGS, 0.028 inch nominal thickness; satin finish.
    - 1) Color: Color matched to match cabinet melamine interior color.
  - d. Concealed Surfaces: High-pressure laminate backer, BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with

- high pressure decorative laminate.
14. Edging: PVC edge banding, machine-applied using hot-melt adhesives. Apply after face laminates are applied.
    - a. Exposed ends of cabinet ends, doors, drawer fronts: 3 mm thickness.
      - 1) Color: Unless noted otherwise, color to be selected by Architect from casework manufacturer's standard stock PVC colors.
    - b. Exposed edges of cabinet shelves, sub-tops, bottoms and partitions: 0.018 inch thickness.
      - 1) Color: To match cabinet interior melamine selection.
    - c. Edges of underside of upper cabinets, and drawer parts: 0.018 inch thickness.
      - 1) Color: To match cabinet interior melamine selection.
  - C. Countertops: As specified in Section 12 36 00.
    1. Backing: Pressure glued to plywood core backing, without visible joints.

## 2.05 MATERIALS

- A. Core Materials:
  1. Particleboard: Premium grade particle board, minimum 45 lb. density meeting ANSI A208.1.
  2. Softwood Plywood: PS1.
  3. Hardwood Plywood: HPVA HP01.
- B. Hardboard: ANSI A135.4, Class 1, tempered.
- C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as specified for specific applications.
  1. Manufacturers:
  2. Formica Corporation: [www.formica.com](http://www.formica.com).
  3. Panolam Industries International, Inc\Nevamar: [www.nevamar.com](http://www.nevamar.com).
  4. Panolam Industries International, Inc\Pionite: [www.pionite.com](http://www.pionite.com).
  5. Wilsonart International, Inc: [www.wilsonart.com](http://www.wilsonart.com).
- D. Thermally Fused Melamine Laminate: Meet ALA standards; lamination achieved through self-bonding of the resin under 300 PSI at 320-degrees F.
- E. Cabinet Hardware: Manufacturer's standard styles, exposed components stainless steel.
  1. Finish of Exposed Components: Satin chrome (26D) finish, unless noted otherwise.
  2. Shelves: Adjustable shelving system using locking shelf clips inserted into pre-drilled 5 mm holes on 32 mm (1-1/4 inch) centers.
    - a. Shelf Clips: Polycarbonate double-pin locking shelving clip. Basis-of-Design: Allen Fields #55036; clear.
  3. Swinging Doors:
    - a. Hinges: Full Mortise, Five Knuckle, Plain Bearing Hinge, 4-inch by 44-inch USP.
    - b. Catches: Magnetic, 7 lb pull rating with metal base and plastic housing to match cabinet interior.
    - c. Pulls: Solid metal, 5/16 inch bent wire pulls, 4 inches wide, nominal.
  4. Drawers:
    - a. Pulls: Solid metal, 5/16 inch bent wire pulls, 4 inches wide, nominal.
    - b. Slides for Standard Drawers: White epoxy coated steel, single extension drawer runners with self-closing action; positive in and out stops; 75 lb dynamic load rating, 100 lb static load rating. Basis-of-design: Blum #230M.
    - c. Slides for Shallow Drawers: Zinc-plated, full extension drawer runners with steel ball bearings; positive in and out stops and stay-closed detent; 90 lb load rating. Basis-of-design: Accuride #3834.
    - d. Slides for File Drawers: Zinc-plated, full extension drawer runners with steel ball bearings; positive in and out stops and stay-closed detent; 150 lb load rating. Basis-of-design: Accuride #4032/4034.

- e. Accessories for File Drawers: PVC hanging file rails fitted to top of drawer slides.
- f. Slides for Standard Drawers: White epoxy coated steel,
- 5. Locks: ANSI/BHMA A156.11 Grade 2, Deadbolt type with solid brass cylinder, five-pin tumbler.
  - a. Drawers: Basis-of-Design: CompX National #C8179.
  - b. Doors: Basis-of-Design: CompX National #C8173.
  - c. Slidebolts: Provide manufacturer's standard metal slidebolt for inactive leaf of locking double cabinet doors.
  - d. Keying: Cabinets keyed per room. Provide two keys per lock.
- 6. Grommets: Two-piece plastic wire management grommets, 2-3/8 inch diameter.
  - a. Basis-of-Design: Hafele #429.999.
    - 1) Color: To be selected by Architect from manufacturer's standard colors.
- 7. Support Brackets: 1-1/2 inch x 1-1/2 inch welded, powder-coated, tube steel support bracket, length of legs designed to support countertop depth indicated.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

#### **3.02 EXAMINATION**

- A. Site Verification of Environmental Conditions:
  - 1. Do not deliver casework until the following conditions have been met:
    - a. Building has been enclosed (windows and doors sealed and weather-tight).
    - b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
    - c. Ceiling, overhead ductwork, piping, and lighting have been installed.
    - d. Installation areas do not require further "wet work" construction.
- B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
- C. For Wall Cabinets Installation: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
  - 1. Maximum variation from plane of masonry wall exceeds 1/4 inch in 10 ft and 1/2 inch in 20 ft or more, and/or maximum variation from plumb exceeds 1/4 inch per story.
  - 2. Maximum Variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.
- D. Verify adequacy of support framing and anchors.
- E. Verify that service connections are correctly located and of proper characteristics.

#### **3.03 INSTALLATION**

- A. Perform installation in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
- E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
  - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.

2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
  3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
  4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- F. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- G. Install hardware uniformly and precisely.
- H. Countertops: Install countertops intended and furnished for field installation in one true plane, with ends abutting at hairline joints, and no raised edges.
- I. Replace units that are damaged, including those that have damaged finishes.

#### **3.04 ADJUSTING**

- A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

#### **3.05 PROTECTION**

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.
- C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

**END OF SECTION**

**SECTION 12 36 00  
COUNTERTOPS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Countertops for manufactured casework.
- B. Wall-hung counters and vanity tops.

**1.02 REFERENCE STANDARDS**

- A. ANSI A208.1 - American National Standard for Particleboard 2022.
- B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications 2022.
- C. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2019.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.
- E. AWI (QCP) - Quality Certification Program Current Edition.
- F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- H. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- I. PS 1 - Structural Plywood 2019.
- J. SEFA 3 - Laboratory Work Surfaces 2010.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- G. Installation Instructions: Manufacturer's installation instructions and recommendations.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- B. Quality Certification:
  - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: [www.awiqcp.org/#sle](http://www.awiqcp.org/#sle).
  - 2. Provide labels or certificates 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 certification program.
  - 4. Provide designated labels on installed products as required by certification program.

5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

### **1.06 FIELD CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

## **PART 2 PRODUCTS**

### **2.01 COUNTERTOPS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Quality Standard: SEFA 3 for laboratory worksurfaces.
- C. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
  1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
    - a. Manufacturers:
      - 1) Formica Corporation: [www.formica.com/#sle](http://www.formica.com/#sle).
      - 2) Panolam Industries International, Inc; Nevamar Standard HPL: [www.panolam.com/#sle](http://www.panolam.com/#sle).
      - 3) Panolam Industries International, Inc; Pionite Standard HPL: [www.panolam.com/#sle](http://www.panolam.com/#sle).
      - 4) Wilsonart: [www.wilsonart.com/#sle](http://www.wilsonart.com/#sle).
      - 5) Substitutions: See Section 01 60 00 - Product Requirements.
    - b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
    - c. Finish: Matte or suede, gloss rating of 5 to 20.
    - d. Surface Color and Pattern: As selected by Architect from the manufacturer's full line.
  2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
  3. Back and End Splashes: Same material, same construction.
  4. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.

### **2.02 MATERIALS**

- A. Extruded Aluminum: ASTM B211/B211M, 6463 alloy, T5 temper.
- B. Wood-Based Components:
  1. Wood fabricated from old growth timber is not permitted.
- C. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- D. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
- E. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- F. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- G. Joint Sealant: Mildew-resistant silicone sealant, white.

## **2.03 FABRICATION**

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  - 1. Join lengths of tops using best method recommended by manufacturer.
  - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  - 2. Height: 4 inches, unless otherwise indicated.
- C. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.03 INSTALLATION**

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Apply sealer products in accordance with manufacturer's written instructions.
- D. Seal joint between back/end splashes and vertical surfaces.

### **3.04 TOLERANCES**

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

### **3.05 CLEANING**

- A. Clean countertops surfaces thoroughly.

### **3.06 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

**SECTION 22 00 00**  
**BASIC PLUMBING REQUIREMENTS**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This Section specifies the basic requirements for all Contractor installed equipment. It applies to all sections included in Division 22. The requirements herein are an expansion upon the requirements of Division 1.
- B. Provide all materials, labor and equipment required to install complete and fully operational plumbing systems as indicated by the contract drawings and this specification.
- C. Obtain and pay for all permits, licenses, fees and taxes applicable to this project as required by law.
- D. Cooperate with other trades in furnishing material and information required for installation and operation of mechanical items.
- E. Requirements for the following are included:
  - 1. Related work (other Contract Documents and specification sections) that must be combined with the requirements of this Section.
  - 2. Design performance.
  - 3. Delivery, storage, and handling.
  - 4. Quality assurance and standards.
  - 5. Submittals.
  - 6. Product quality, basic type, and finishes.
  - 7. Equipment identification.
  - 8. Excavation and backfill.
  - 9. Installation.
  - 10. Mounting and shimming.
  - 11. Inspection.
  - 12. Safety considerations.
  - 13. Cleaning, startup, and adjustments.

**1.02 RELATED WORK**

- A. This general section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for the project equipment and systems:
  - 1. Division 1 sections included in this Project specifications.
  - 2. The Contract.
  - 3. General and specific mechanical specifications and drawings included in the project.



### 1.03 DEFINITIONS

- A. "Indicated": Refers to graphic representations, notes or schedules in the Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents.
  - 1. Terms such as "shown", "noted", "scheduled", and "specified", are used to notify or help the user to locate reference. Location is not limited.
- B. "Directed": Terms such as "directed", "Requested", "authorized", "selected", "approved", "required", and "permitted" mean directed by Architect/Engineer, approved by Architect/Engineer and similar phrases.
- C. "Approved": When used in conjunction with Architect/Engineer's action on contract submittals, applications, requests, is limited to Architect/Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- D. "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 Work.
- E. "Furnish": Means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation and similar operations.
- F. "Install": Describes operations at Project site including actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, supporting, isolating, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.
- G. "Provide": Means to furnish and install.
- H. "Installer": A contractor, or another entity engaged by the contractor, either as an employee, subcontractor, or contractor of a lower tier, to perform a particular construction activity including installation, erection, application or similar operations.
  - 1. Installers are required to be experienced in operations they are engaged to perform.
  - 2. The term "experience" means having successfully completed a minimum of three previous projects similar in scope and size to this Project and within the time frame indicated in the "Quality Assurance" section of the Specifications. In addition, it means being familiar with special requirements indicated and having complied with requirements of authorities having jurisdiction.
- I. "Project Site": Is defined as the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project.

### 1.04 DESIGN PERFORMANCE

- A. Compliance by the Contractor and/or Vendor with the provisions of this Specification does not relieve him of the responsibilities of furnishing equipment and materials of proper design, mechanically suited to meet operating guarantees at the specified service conditions.

### 1.05 SUBMITTALS

- A. Product Data: Submit complete sets of manufacturer's product data in .PDF format for approval. All submittals are to be received in no more than (3) three packages. See Division 1 for further information regarding submittal requirements. Literature submitted shall clearly indicate the model number, capacity, rated operating conditions, noise levels, size, weight, support requirements, rough-in data and dimensions, electrical power requirements, wiring diagrams, utility (fuel, air, cooling water, etc.) requirements, and options furnished. Submittals shall include, but are not necessarily limited to the following;
  - 1. Plumbing: Piping and insulation; Plumbing fixtures, including trim; insulation; valves; hangers and supports; equipment bases; isolators; water heaters; booster pumps and the like.
- B. Operation and Maintenance Data: Submit three complete sets of manufacturer's literature in .PDF format for approval. Data shall include installation, start-up, and maintenance instructions, parts lists, and wiring diagrams. Include all material on a CD-ROM or USB device.
- C. Substitutions: System design was based upon the equipment and materials listed on the drawings and specifications herein. At contractor's option, another manufacturer's equipment of similar quality, capacity and features may be submitted for prior approval per Section 01 60 00. Prior permission to substitute does not relieve the contractor of the responsibility of including this information in the bound submittal packages.

### 1.06 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the provisions of the following codes, standards and specifications, except where more stringent requirements are shown or specified:
  - 1. State of Washington "IBC".
  - 2. State of Washington "IMC".
  - 3. State of Washington "UPC".
  - 4. State of Washington "IFC".
  - 5. ANSI/ASHRAE 90 - "Energy Efficient Design of New Buildings...."
  - 6. ASME B31.9 "Building Service Piping".
  - 7. NFPA 54 and NFPA 90B.
- B. Drawings: All drawings are diagrammatic and show general design, arrangement, and extent of the systems. Do not scale drawings for rough-in dimensions, nor use as shop drawings.
- C. Installer Qualifications: Company specializing in performing the work required with a minimum of five years documented experience.
- D. Contractor shall furnish and install all work in accordance with manufacturers' recommendations and instructions.

### **1.07 DELIVERY, STORAGE AND PROTECTION**

- A. Delivery: Deliver to site with manufacturer's labels intact and legible.
- B. Preparation for Shipment:
  - 1. Each unit shall be suitably prepared for the shipment specified and for storage in accordance with manufacturer's instructions in a manner requiring no disassembly prior to operation.
  - 2. The Contractor shall be solely responsible for the adequacy of the Preparation for Shipment provisions employed with respect to materials and application.
  - 3. One complete set of Installations, Operating and Maintenance Instructions shall be packed and shipped with the equipment. This set is in addition to the sets that are to be sent directly to the Owner.
- C. Handling: Avoid damage. Comply with manufacturer's installation instruction requirements for rigging, unloading and transporting units.
- D. Storage: Inside protected from weather, dirt and construction dust. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping. Cap all pipe ends. Taping pipe ends is not adequate or allowable.

### **1.08 PROJECT CONDITIONS**

- A. General: Provide products which are compatible with other portions of the work and provide products with the proper power characteristics and similar adaptations for the project.
- B. Arrangement: Arrange piping parallel with primary lines of the building construction and with a minimum 7 feet overhead clearance in unfinished equipment rooms where possible. Conceal all piping where possible unless indicated otherwise. Locate operating and control equipment properly to provide easy access for operation and maintenance. Give right-of-way to piping which must be sloped for drainage. Set all equipment level or as recommended by manufacturer.
- C. Coordination: Where several elements of the work must be sequenced and positioned in order to fit the available space, prepare shop drawings showing the actual physical dimensions (at accurate scale) required for installation and submit prior to purchase/fabrication/installation of any of the elements involved in the coordination.

### **1.09 STANDARDS**

- A. General: Provide all new materials and equipment, identical to apparatus or equipment in successful operation for a minimum of five years. Provide materials of comparable quality omitted here but necessary to complete the work. Maximum allowable variation from stated capacities, minus 5% to plus 10% as approved in each case.
- B. Governing Standards: The following are typical standards generally referenced in these specifications and identified by their acronym. Federal Specifications (FS), American Society for

Testing Materials (ASTM), American National Standards Institute (ANSI), Manufacturer's Standardization Society of the Valve and Fitting Industry, Standard Practice (MSS SP-69), Cast Iron Soil Pipe Institute (CISPI), Underwriters Laboratory (UL) numbers are given.

### **1.10 WARRANTIES**

- A. Contractor shall provide a 1 year warranty on all equipment, materials and workmanship for a period of one year from the date of owner's acceptance.

## **PART 2 PRODUCTS (NOT USED)**

## **PART 3 EXECUTION**

### **3.01 LAYOUT AND COORDINATION**

- A. Site Examination: Before starting work, carefully examine site and all Contract Drawings. Become thoroughly familiar with conditions governing work on this project. Verify all indicated elevations, building measurements, rough-in dimensions and equipment locations before proceeding with any work.
- B. Utility Locations: The location of all utilities, wires, conduits, pipes, ducts, or other service facilities are shown in a general way only on the drawings and in some instances are taken from existing drawings. Ascertain whether any additional facilities other than those shown on the plans may be present and determine the exact location and elevations of all utilities prior to commencing installation.
- C. Discrepancies: Any error, conflict or discrepancy in Drawings, Specifications and/or existing conditions shall be reported immediately. Do not proceed with any questionable items of work until clarification of same has been made. Should rearrangement or re-routing of piping or ductwork be necessary, provide for approval the simplest layout possible for that particular portion of the work. Under no circumstances shall beams, girders, footings or columns be cut for mechanical items. Casting of pipes into concrete is prohibited unless so shown on Drawings.
- D. The Contractor shall cooperate with others to avoid interferences and delays in the construction work.
- E. Interference as a result of poor coordination or lack of cooperation with other trades shall be corrected at the Contractor's expense.

### **3.02 CUTTING AND PATCHING**

- A. General: Perform cutting and patching in accordance with Division 1.
- B. Protection: During cutting and patching, protect adjacent installations. Provide temporary barriers to prevent the spread of dust and dirt outside of the immediate work area.
- C. Repair: Patch finished surfaces and building components using new materials to match the existing.

- D. Inspection: Upon written direction from the Architect, uncover and restore work to provide for observation of concealed work.

### 3.03 EXCAVATION AND BACKFILL

- A. General: Perform all necessary excavation and backfill required for the installation of mechanical work. Any piping or other work damaged by the Contractor's operations shall be repaired at the Contractor's expense.
- B. Water: Keep all excavations free of standing water. Excavations damaged or softened by water or frost shall be re-excavated and filled back to original level with approved material at the Contractor's expense.
- C. Test: During the progress of the work for compacted fill, the Owner reserves the right to request compaction tests made under the direction of a testing laboratory.
- D. Trench Excavation: Excavate trenches to the necessary depth and width, removing rocks, unstable soil (silt, peat, etc.) roots and stumps. Width of trench shall be adequate for proper installation of piping or conduit.
- E. Foundation and Bedding:
  - 1. Proper preparation of foundation, placement of foundation material where required, and placement of bedding material shall precede the installation of the pipe. This shall include leveling of the trench bottom as well as placement and compaction of required bedding material to a uniform grade so that piping rests upon a continuous and uniform bedding.
  - 2. Where excavation has been made below the required grade, the Contractor shall provide, place and compact suitable bedding material to restore the proper grade elevation.
- F. Provide tracer wire over top of piping.
  - 1. Construction:
    - a. Conductor: Solid or stranded copper per spec ASTM B3.
    - b. Insulation: High Molecular Weight Polyethylene (HMWPE) ASTM D1248. Various insulation colors dependant on usage.
    - c. Temperature: 70 degrees C dry and wet.
    - d. Voltage: 20 and 30 Mil = 30 to 300 volts. 45 Mil = 600 volts.
- G. Backfilling: Upon acceptance of installed piping systems, trenches shall be backfilled in lifts. Backfill material shall be placed and compacted in lifts not to exceed 6 inches in depth to a height of 1 inch above the top of trench. Backfill shall be placed to obtain contact with the entire periphery of the pipe without disturbing pipe placement.
- H. Compaction: One of the following methods or combination thereof shall be required; 1) Mechanical Tamper or Vibratory Compactor. Compaction shall be sufficient to attain 95% of maximum density at optimum moisture content. Water "puddling" or "washing" is prohibited.
- I. Bedding/Backfill Material: Where native material has been removed, necessary foundation material consisting of 3/4 inch minus crushed rock or fill sand shall be placed and compacted to

form a firm base of the required thickness. Backfill material shall be the same. Follow the pipe manufacturer's installation instructions when specified materials are specifically prohibited.

### **3.04 EQUIPMENT REMOVAL**

- A. All removed equipment is the property of the Contractor unless indicated otherwise. Disconnect and remove all such equipment from the property. Cap all piping in walls, below floors, and/or above ceilings in finished rooms.
- B. Where equipment is to be reused, reconnect piping, wiring and/or controls to allow this equipment to function as it had prior to this renovation unless indicated otherwise.

### **3.05 MECHANICAL EQUIPMENT WIRING**

- A. Provide all motor starters, control devices, and wiring complete from power source indicated on Drawings.
- B. Equipment and systems shown on the Drawings and/or specifications, are based upon requirements of specific manufacturers which are intended as somewhat typical of several makes which may be approved. Provide all field wiring and/or devices necessary for a complete and operable system controls for the actual selected equipment/system.

### **3.06 INSTALLATION**

- A. Locating and Positioning Equipment: Observe all Codes and Regulations and good common practice in locating and installing mechanical equipment and material so that completed installation presents the least possible hazard. Maintain recommended clearances for repair and service to all equipment.
- B. Anchorage: Anchor and/or brace all mechanical equipment, piping to resist displacement due to seismic action, include snubbers on equipment mounted on spring isolators.
- C. Where mounting heights or locations are not identified, install systems, equipment and materials to provide maximum headroom.
- D. Provide clearance for installation of insulation and access to valves, fittings, damper actuators, etc. on pipe and duct systems.
- E. Install systems, materials and equipment giving right of way to systems required to be installed at a specific slope or operation by gravity.
- F. Provide condensate drain piping to over nearest floor drain for all coils, furnaces, boilers, domestic water heaters and the likes.
- G. Flush clean and disinfect domestic water system.
- H. Provide chrome plated rigid or flexible supplies to fixtures with stops, reducers, and escutcheons.
- I. Provide trap primers and piping for floor drains and floor sinks.
- J. Installation shall be in accordance with the requirements of the equipment manufacturer, including special requirements for seismic restraints.

K. Equipment Manufacturer's Responsibility and Services:

1. A manufacturer's representative for major equipment and operating systems shall be provided as necessary to assist the Contractor during installation, and to provide written certification that the equipment has been installed as specified and in accordance with the manufacturer's representative.
2. The manufacturer's representative shall provide the initial startup of equipment in the presence of the Owner.
  - a. Provide a pre-start check of all piping, valves, control devices, control panels, and equipment.
  - b. Calibrate and adjust equipment and controls for operation at the specified design and conditions.
  - c. Provide a record of all startup events noting problems and their resolution.
  - d. Provide a record of all set points for operational controls and devices.
3. Upon the completion of the equipment startup, provide instructional time with the Owner's personnel to review the operations and maintenance manuals and perform each step necessary for startup, shutdown, troubleshooting, and routine maintenance. The instructional time shall be scheduled through the Owner.
4. Upon completion of the inspections, startup, testing, and checkout procedures, the equipment manufacturer shall submit written notice to the Owner that the units are ready for use by the Owner. Provide a certificate of calibration for all equipment.

**3.07 MOUNTING AND SHIMMING**

- A. Mount equipment as shown on the Drawings. Provisions for mounting special equipment on spring isolators, snubbers, and inertia bases are specified in Section 22 05 48, Vibration Isolation and Sound and Seismic Controls for Plumbing Piping and Equipment.
- B. Level the equipment by means of 304 stainless steel wedges (stainless steel plates and stainless steel shims). Wedge taper shall not be greater than 1/4 inch per foot. Use double wedges to provide a level bearing surface for the equipment. Secure each pair of wedges in their final positions with one tack weld on each side after leveling is complete. Wedging shall be executed in a manner that will prevent a change in level or springing of the Baseplate when the anchor bolts are tightened.
  1. Adjust rotating equipment assemblies such that the driving units are properly aligned, plumb and level with the driven units and all interconnecting shafts and couplings.
  2. All rotating equipment shall be checked for proper alignment with dial indicators or laser after completion of grouting. The alignment must be within the tolerances required by the equipment manufacturer. The final alignment check shall be witnessed by the Owner.

### **3.08 INSPECTION**

- A. The Contractor shall inspect his work to ensure the installation and workmanship is in accordance with these specifications and acceptable industry standards for the work being done.
- B. All materials, equipment, and workmanship shall be subject to inspection at any time by the Owner. Contractor shall correct any work, materials, or equipment not in accordance with the Contract Documents.

### **3.09 SAFETY CONSIDERATIONS**

- A. All equipment shall be installed with suitable access clearances that satisfy OSHA and code requirements for maintenance or removal of replaceable parts and components, and with necessary unions or flanges to perform the maintenance or removal without removing the connecting appurtenances.
- B. Where equipment requiring periodic maintenance cannot be reached by normal walkways because of interference with ductwork, piping, or other obstructions the Contractor shall notify the Owner and propose an alternate safe means of access. These may include construction of an overhead platform with stairway or ladder ends and safety railings or handholds, or walk-through duct plenums with hinged access doors, or as required to meet OSHA standards for safe maintenance procedures.

### **3.10 CLEANING, START-UP, AND ADJUSTING**

- A. The Contractors shall be responsible for proper operation of all systems, minor subsystems, and services provided under this section. He shall coordinate start-up procedures, calibration, and system checkout with all project managers. Any system operational problems shall be diagnosed; all correctional procedures shall be initiated as required to bring out the system into compliance with the design, and the problem then shall be rechecked to verify that the system operates normally.
- B. Thoroughly clean all parts of the installation at the completion of the work. The Contractor shall clean up and remove from the premises all refuse material, crates, and rubbish arising from his work. Remove, clean, and reinstall all filters. Belt-drive tensions and alignments shall be checked. All motors and bearings shall be lubricated in accordance with the manufacturer's service manuals prior to equipment start-up. Provide a lubrication schedule for every item of equipment furnished under this section. The schedule shall include the type of lubricant and the application frequency.

**END OF SECTION**



**SECTION 22 05 19**  
**METERS AND GAUGES FOR PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pressure gauges and pressure gauge taps.
- B. Thermometers and thermometer wells.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 10 05 - Plumbing Piping.

**1.03 REFERENCE STANDARDS**

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014, with Editorial Revision (2017).
- D. AWWA C701 - Cold-Water Meters -- Turbine Type, for Customer Service; 2019.
- E. AWWA C702 - Cold-Water Meters -- Compound Type; 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
- C. Project Record Documents: Record actual locations of components and instrumentation.
- D. Operation and Maintenance Data: Section 01 70 00.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements. for additional provisions.
  - 2. Supply two bottles of red gage oil for static pressure gages.
  - 3. Supply two pressure gages with pulsation damper and two dial thermometers.

**1.05 FIELD CONDITIONS**

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

**PART 2 PRODUCTS**

**2.01 PRESSURE GAUGES**

- A. Manufacturers:
  - 1. Weksler; Model 401: [www.weksler-gauges.com](http://www.weksler-gauges.com).
  - 2. Trerice; Model 700 Series: [www.trerice.com](http://www.trerice.com).
  - 3. Ametek (U.S. Gauge); Model Series 540: [www.ametekusg.com](http://www.ametekusg.com).

4. Other approved manufacturers: Ashcroft, Marshalltown, Weiss.
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Pressure Gages: ASME B40.100, 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. Size: 4-1/2 inch diameter.
  3. Mid-Scale Accuracy: One percent.
  4. Scale: Psi and kPa.

## **2.02 PRESSURE GAUGE TAPPINGS**

- A. Manufacturers:
1. Weksler: [www.weksler-gauges.com](http://www.weksler-gauges.com).
  2. Trerice : [www.trerice.com](http://www.trerice.com).
  3. Ametek (U.S. Gauge): [www.ametekusg.com](http://www.ametekusg.com).
  4. Other approved manufacturers: Ashcroft, Marshalltown, Weiss.
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.
1. Product: A20 manufactured by Weksler, or approved equal.
- C. Ball Valve: Brass 1/4 inch NPT cock, for 200 psi. Lever handle.
1. Product: A12 manufactured by Weksler, or approved equal.
- D. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.
1. Product: BBV4 manufactured by Weksler.
- E. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.
1. Product: WG41/WG42 manufactured by Weksler.
- F. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.
1. Product: AO31 manufactured by Weksler.

## **2.03 STEM TYPE THERMOMETERS**

- A. Manufacturers:
1. Weksler Glass Thermometer Corp: [www.wekslerglass.com](http://www.wekslerglass.com).
  2. Trerice; Model A00: [www.trerice.com](http://www.trerice.com).
  3. Ametek (U.S. Gauge); Model Fig. MN: [www.ametekusg.com](http://www.ametekusg.com).
  4. Other approved manufacturers: Ashcroft, Marshalltown, Weiss.
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.

1. Size: 9 inch scale.
  2. Window: Clear glass.
  3. Stem: 3/4 inch brass.
  4. Accuracy: 2 percent, per ASTM E77.
  5. Calibration: Degrees F.
- C. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
1. Size: 9 inch scale.
  2. Window: Clear glass.
  3. Stem: 3/4 inch NPT brass.
  4. Accuracy: 2 percent, per ASTM E77.
  5. Calibration: Degrees F.

#### **2.04 DIAL THERMOMETERS**

- A. Manufacturers:
1. Weksler Glass Thermometer Corp: [www.wekslerglass.com](http://www.wekslerglass.com).
  2. Trerice; Model B8560: [www.trerice.com](http://www.trerice.com).
  3. Ametek (U.S. Gauge); Model Series 6000: [www.ametekusg.com](http://www.ametekusg.com).
  4. Other approved manufacturers: Ashcroft, Marshalltown, Weiss.
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Thermometers - Adjustable Angle: Dial type bimetallic actuated; ASTM E1; stainless steel case, adjustable angle with front recalibration, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
1. Size: 5 inch diameter dial.
  2. Lens: Clear glass.
  3. Accuracy: 1 percent.
  4. Calibration: Degrees F.

#### **2.05 THERMOMETER SUPPORTS**

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install positive displacement meters with isolating valves on inlet and outlet to AWWA M6. Provide full line size valved bypass with globe valve for liquid service meters.

- C. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.
- D. Install pressure gages with pulsation dampers. Provide needle valve to isolate each gage. Extend nipples to allow clearance from insulation.
- E. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- F. Coil and conceal excess capillary on remote element instruments.
- G. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- H. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- I. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- J. Locate test plugs adjacent to pressure gages and pressure gage taps.

### **3.02 SCHEDULES**

- A. Positive Displacement Meters, Location:
  - 1. Domestic cold water.
  - 2. Expansion tank make-up.
- B. Pressure Gauges, Location and Scale Range:
  - 1. Pumps, 0 to 100 psi.
  - 2. Expansion tanks, 0 to 100 psi.
  - 3. Pressure reducing valves, 0 to 100 psi.
  - 4. Backflow preventers, 0 to 100 psi.
- C. Stem Type Thermometers, Location and Scale Range:
  - 1. Water zone supply and return, 0 to 200 degrees F.
  - 2. Domestic hot water supply and recirculation, 0 to 200 degrees F.

**END OF SECTION**

**SECTION 22 05 29**

**HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe hangers and supports.
- B. Hanger rods.
- C. Inserts.
- D. Flashing.
- E. Sleeves.
- F. Mechanical sleeve seals.
- G. Formed steel channel.
- H. Firestopping relating to mechanical work.
- I. Firestopping accessories.
- J. Equipment bases and supports.

**1.02 RELATED SECTIONS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Execution requirements for placement of concrete housekeeping pads specified by this section.
- B. Section 07 92 00 - Joint Sealants: Product requirements for sealant materials for placement by this section.
- C. Section 09 91 23 - Interior Painting: Product and execution requirements for painting specified by this section.
- D. Section 22 07 16 - Plumbing Equipment Insulation: Execution requirements for placement of hangers and supports specified by this section.

**1.03 REFERENCES**

- A. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers.
- B. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials; American Society for Testing and Materials.
- C. ASTM E119 - Method for Fire Tests of Building Construction and Materials; American Society for Testing and Materials.
- D. ASTM E814 - Test Method of Fire Tests of Through Penetration Firestops; American Society for Testing and Materials.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society.
- F. UL 723 - Tests for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.
- G. UL 1479 - Fire Tests of Through-Penetration Firestops; Underwriters Laboratories Inc.

#### **1.04 DEFINITIONS**

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

#### **1.05 SYSTEM DESCRIPTION**

- A. Firestopping Materials: ASTM E119 and ASTM E814 (UL 1479) to achieve fire ratings of adjacent construction noted in Division 1 documents and in accordance with UL Design Numbers.
- B. Surface Burning: ASTM E84/UL 723 with maximum flame spread/smoke developed rating of 25/450.
- C. Firestop interruptions to fire rated assemblies, materials, and components.

#### **1.06 SUBMITTALS**

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.
- C. Product Data:
  - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
  - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- E. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers. Submit sizing methods and calculations sealed by a registered professional engineer.
- F. Manufacturer's Installation Instructions:
  - 1. Hangers and Supports: Submit special procedures and assembly of components.
  - 2. Firestopping: Submit preparation and installation instructions.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- H. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

#### **1.07 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of Washington standards.

- B. Perform Work in accordance with AWS D1.1/D1.1M for welding hanger and support attachments to building structure.
- C. Maintain one copy of the document on site.

#### **1.08 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

#### **1.09 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

#### **1.10 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

#### **1.11 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.
- D. Provide ventilation in areas to receive solvent cured materials.

#### **1.12 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

#### **1.13 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

### **PART 2 PRODUCTS**

#### **2.01 PIPE HANGERS AND SUPPORTS**

- A. Manufacturers:
  - 1. Tolco Inc.
  - 2. Anvil.

3. Michigan Hanger Company, Inc.
  4. PHD Manufacturing Co.
  5. Superstrut.
  6. Unistrut.
  7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Plumbing Piping - DWV:
1. Conform to ASME B31.9.
  2. Hangers for Pipe Sizes 1/2 to 2-1/2 inches: Carbon steel, adjustable swivel, split ring.
  3. Hangers for Pipe Sizes 3 inches and Larger: Carbon steel, adjustable, clevis.
  4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
  6. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
  7. Vertical Support: Steel riser clamp.
  8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  9. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.
- C. Plumbing Piping - Water:
1. Conform to ASME B31.9.
  2. Hangers for Pipe Sizes 1/2 to 2-1/2 inches (unless other noted): Carbon steel, adjustable swivel, split ring.
  3. Hangers for Cold Pipe Sizes 3 inches and Larger: Carbon steel, adjustable, clevis.
  4. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
  5. Hangers for Hot Pipe Sizes 6 inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
  6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
  8. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
  9. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
  10. Wall Support for Hot Pipe Sizes 6 inches and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
  11. Vertical Support: Steel riser clamp.
  12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.



13. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Copper-plated, Carbon-steel ring.

## **2.02 ACCESSORIES**

- A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

## **2.03 INSERTS**

- A. Manufacturers:
  1. Anvil Fig. 281.
  2. PHD Fig 951.
  3. Michigan Hanger Model 355EG.
  4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Inserts: Carbon steel case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## **2.04 FLASHING**

- A. Metal Flashing: 26 gage thick galvanized steel.
- B. Metal Counterflashing: 22 gage thick galvanized steel.
- C. Lead Flashing:
  1. Waterproofing: 5 lb./sq. ft. sheet lead
  2. Soundproofing: 1 lb./sq. ft. sheet lead.
- D. Flexible Flashing: 1.85 inches thick sheet butyl; compatible with roofing.
- E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

## **2.05 SLEEVES**

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- C. Sealant: Acrylic; refer to Section 07 92 00 - Joint Sealants.
- D. Sleeves Through Rated Concrete Decks: ASTM E814 (UL 1479), UL Classified for W, L, F, T, and FM approved. Hilti Model Series CP/CPS; HoldRite "Hydroflam" Pro Series, or 3M Fire Barrier Cast-In Devices.
- E. Sleeve Through Rated Concrete Floors: 3-hour per ASTM E814, UL W, L, F, T, and FM approved. Hilti Model Series CP/CPS; HoldRite "Hydroflame" Pro Series.

## **2.06 FORMED STEEL CHANNEL**

- A. Manufacturers:
  - 1. Unistrut Model Series P1000.
  - 2. Superstrut Model Series 1200.
  - 3. Michigan Hanger "O-Strut" Model A-12.
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

## **2.07 FIRESTOPPING**

- A. Manufacturers:
  - 1. Specified Technology Inc. (STI) Model SpecSeal Series 100.
  - 2. Dow Corning Corp.
  - 3. Hilti Corp.
  - 4. International Protective Coating Corp.
  - 5. 3M fire Protection Products.
  - 6. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
  - 1. Silicone Firestopping Elastomeric Firestopping: Single or multiple component silicone elastomeric compound and compatible silicone sealant.
  - 2. Foam Firestopping Compounds: Single or Multiple component foam compound.
  - 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
  - 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
  - 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
  - 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
  - 7. Firestop Pillows: Formed mineral fiber pillows.
- C. Color: As selected from manufacturer's full range of colors.

## **2.08 FIRESTOPPING ACCESSORIES**

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: Permanent:

1. Mineral fiberboard.
  2. Mineral fiber matting.
  3. Sheet metal.
  4. Plywood or particle board.
  5. Alumina silicate fire board.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. General:
1. Furnish UL listed products.
  2. Select products with rating not less than rating of wall or floor being penetrated.
- E. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
  2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water-stop type wall sleeve.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive firestopping.

#### **3.02 PREPARATION**

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install backing or damming materials to arrest liquid material leakage.
- D. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- E. Do not drill or cut structural members.

#### **3.03 INSTALLATION - INSERTS**

- A. Install inserts for placement in concrete forms.
- B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

### **3.04 INSTALLATION - PIPE HANGERS AND SUPPORTS**

- A. Install in accordance with ASME B31.9.
- B. Support horizontal piping as scheduled.
- C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Use hangers with 1-1/2 inches minimum vertical adjustment.
- F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- G. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- I. Support riser piping independently of connected horizontal piping.
- J. Provide copper plated hangers and supports for copper piping.
- K. Design hangers for pipe movement without disengagement of supported pipe.
- L. Prime coat exposed steel hangers and supports. Refer to Section 09 91 23 - Painting and Coating. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- M. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 16 - Plumbing Equipment Insulation.

### **3.05 INSTALLATION - EQUIPMENT BASES AND SUPPORTS**

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond all anchor bolts for supported equipment. Refer to Section 03 30 00 - Cast-in-Place Concrete.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members, formed steel channel, steel pipe and fittings. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

### **3.06 INSTALLATION - FLASHING**

- A. Provide flexible flashing and metal counterflashing where piping penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet

size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.

- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inches sheet size. Fasten flashing to drain clamp device.
- D. Seal floor, shower and mop sink drains watertight to adjacent materials.
- E. Provide acoustical lead flashing around pipes penetrating equipment rooms and roofs for sound control.
- F. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

### 3.07 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with mechanical sleeve seals.
- B. Set sleeves in position in forms. Provide reinforcing around sleeves.
- C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- E. Where piping penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with stuffing or fire-stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- F. Install chrome plated steel escutcheons at finished surfaces.

### 3.08 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply fire-stopping material in sufficient thickness to achieve required fire and smoke rating to uniform density and texture.
- D. Compress fibered material to maximum 40 percent of its uncompressed size.
- E. Place foamed material in layers to ensure homogenous density, filling cavities and spaces.
- F. Place sealant to completely seal junctions with adjacent dissimilar materials.
- G. Place intumescent coating in sufficient coats to achieve rating required.
- H. Remove dam material after firestopping material has cured.
- I. Fire Rated Surface:
  - 1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
    - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
    - b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
    - c. Pack void with backing material.

- d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
  - e. Where cable tray, bus, cable bus, conduit, wire-way, trough, penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.
- J. Non-Rated Surfaces:
- 1. Seal opening through non-fire rated wall, partition, floor, ceiling and roof opening as follows:
    - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
    - b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
    - c. Install type of firestopping material recommended by manufacturer.
    - d. Install escutcheons, floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
    - e. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
    - f. Interior partitions: Seal pipe penetrations at clean rooms, laboratories, hospital spaces, computer rooms, telecommunication rooms, data rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

### 3.09 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements, and : Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

### 3.10 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

### 3.11 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

### 3.12 SCHEDULES

Pipe Size (inches)	Maximum Hanger Spacing (feet)	Hanger Rod Diameter (inches)
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2

4 to 6	10	5/8
C.I Bell and Spigot (or No Hub) and at Joint	5	3/8

**END OF SECTION**

**SECTION 22 05 49**  
**PLUMBING SEISMIC RESTRAINT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Seismic restraint of equipment and piping.

**1.02 RELATED SECTIONS**

- A. Section 22 00 00 - BASIC PLUMBING REQUIREMENTS.
- B. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
- C. Section 22 07 19 - Plumbing Piping Insulation.
- D. Section 22 10 05 - Plumbing Piping.
- E. Section 22 30 00 - Plumbing Equipment.
- F. Section 22 40 00 - Plumbing Fixtures.

**1.03 QUALITY ASSURANCE**

- A. Seismic Restraints:
  - 1. The Anchorage and/or seismic restraint of permanent equipment and associated systems listed below shall be designed to resist the total design seismic forces prescribed in the latest edition of the International Building Code.
    - a. All floor or roof-mounted equipment weighing 400 lbs or greater.
    - b. All suspended or wall-mounted equipment weighing 20 lbs or greater.
    - c. All vibration-isolated equipment weighing 20 lbs or greater.
    - d. All gas piping systems throughout the building.
    - e. All piping 1 1/4 inches nominal diameter and larger located in boiler, mechanical equipment and refrigeration mechanical rooms.
    - f. All piping 2 1/2 inches nominal diameter and larger.
    - g. Pipes, electrical conduit and ducts supported by a trapeze where none of those elements would individually require bracing, require bracing when the combined operating weight of all elements supported by the trapeze is 10 lbs/ft or greater.
- B. All calculations shall be in accordance with Chapter 16 of the latest edition of the International Building Code.

**1.04 SUBMITTALS**

- A. Submit the following in accordance with Section 01 30 00:
  - 1. All anchorage and seismic restraints shall be designed and stamped by a professional engineer licensed in the state of the project location. Design shall include:
    - a. Number, size and location of anchors for floor or roof-mounted equipment. For curb-mounted equipment, provide design of attachment of both the unit to the curb and the



curb to the structure. In addition, provide calculations or test data verifying the curb can accept the seismic loads.

- b. Number, size and location of seismic restraint devices and anchors for vibration-isolated and suspended equipment. Provide calculations or test data verifying the horizontal and vertical ratings of the seismic restraint devices.
- c. Number, size and location of braces and anchors for suspended piping and ductwork on shop drawings. In addition:
  - 1) The contractor must select a single seismic restraint system pre-designed to meet the requirements of the latest edition of the International Building Code such as the 2011 Mason Industries Seismic Restraint Guidelines for Suspended Piping, Ductwork, Electrical Systems and floor and roof mounted equipment.
  - 2) Details or designs from separate seismic restraint guidelines are not acceptable. Installations not addressed by the selected system must be designed, detailed and submitted along with the shop drawings.
  - 3) Maximum seismic loads shall be indicated on drawings at each brace location. Drawings shall bear the stamp and signature of the registered professional engineer licensed in the state of the project location who designed the layout of the braces.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Amber Booth.
- B. Mason Industries, Inc.
- C. Kinetics Corporation.
- D. Vibrex.
- E. Substitutions: Under provisions of Section 01 60 00.

### **2.02 SEISMIC RESTRAINTS**

- A. General Requirements:
  1. Seismic restraints shall be provided for all equipment, both supported and suspended, piping and ductwork as listed above.
  2. Bracing of piping and ductwork shall be in accordance with provisions set forth in SMACNA seismic restraint manual.
  3. Structural requirements for restraints, including their attachment to building structure, shall be reviewed and approved by the structural engineer.
  4. Attachments to supported or suspended equipment must be coordinated with the equipment manufacturer.
- B. Supported Equipment Products:

1. Seismic restraints shall consist of interlocking steel members restrained by shock absorbent neoprene materials compounded to bridge bearing specifications as previously noted in paragraph 1.03. Elastomeric materials shall be replaceable and be a minimum 3/4-inch thick. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8-inch, nor more than 1/4-inch. Type 1 - Seismic Snubbers: All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4 inch thick. A minimum air gap of 1/8 inch shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. The snubber shall be designed to accept horizontal and vertical seismic loads as defined in Section 1.03.B. Mason Type Z-1225 or Z-1011.
  2. Each snubber shall be capable of restraint in all three mutually orthogonal directions. Type 2 - Seismic Sway Braces - Seismic sway braces shall consist of galvanized steel aircraft cables or steel angles/channels. Cables braces shall be designed to resist seismic tension loads and steel braces shall be designed to resist both tension and compression loads with a minimum safety factor of 2. Brace end connections shall be steel assemblies that swivel to the final installation angle. Do not mix cable and steel braces to brace the same system or equipment. Steel angles, when required, shall be clamped to the threaded hanger rods at the seismic sway brace locations utilizing a minimum of two ductile iron clamps. Sway braces shall be designed to accept horizontal and vertical seismic loads as defined in Section 1.03.B. Mason Type SCB, SSB, SRC and UC.
  3. Submittals shall include load versus deflection curves up to 1/2-inch on the x, y and z planes.
  4. Mason Model Z-1011
- C. Bracing of Pipes:
1. Provide seismic bracing of all piping as detailed below. (Exception: Piping suspended by individual hangers 12 inches or less in length, as measured from the top of the pipe to the bottom of the support where the hanger is attached, need not be braced).
    - a. Brace all gas piping.
    - b. Brace all piping located in boiler rooms, mechanical equipment rooms, and refrigeration mechanical rooms that is 1-1/4-inch nominal diameter and larger.
    - c. Brace all pipes 2-1/2-inch nominal diameter and larger.
  2. For all gas piping, as specified in 1(a) the bracing details, schedules, and notes may be used, except that transverse bracing shall be at 20 feet maximum, and longitudinal bracing shall be at 40 feet maximum.
  3. Seismic braces for pipes on trapeze hangers may be used.

4. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints or where rigidly supported pipes connect to equipment with vibration isolators. For threaded piping, the flexibility may be provided by the installation of swing joints.
  5. Cast iron pipe of all types, glass pipe, and any other pipe jointed with a shield and clamp assembly, where the top of the pipe is 12 inches or more from the supporting structure, shall be braced on each side of a change in direction of 90 degrees or more. Riser joints shall be braced or stabilized between floors.
  6. Vertical risers shall be laterally supported with a riser clamp at each floor. For buildings greater than six stories high, all risers shall be engineered individually.
- D. Suspended Equipment and Piping:
1. Cable Method: The seismic restraint shall consist of a combination of stranded steel aircraft cable and the specified vibration isolation hanger with an added nut and neoprene and steel washer. The cable resists lateral and downward motion. The modified vibration hanger resists upward motion.
  2. Cable attachment details, cable size, and the neoprene and steel washers shall be sized by the manufacturer and are to be indicated in the Shop Drawings.
  3. Provide detailed Shop Drawings for approval in sufficient time to allow structural attachment work to be incorporated into the normal work sequence.

## **PART 3 EXECUTION**

### **3.01 SEISMIC RESTRAINTS**

- A. General:
1. Install and adjust seismic restraints so that the equipment, piping, and ductwork supports are not degraded by the restraints.
  2. Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.
- B. Supported Equipment:
1. Each vibration isolation frame for supported equipment shall have a minimum of four seismic snubbers mounted as close as possible to the vibration isolators and/or the frame extremities.
  2. Care must be taken so that a minimum 1/8-inch air gap in the seismic restraint snubber is preserved on all sides in order that the vibration isolation potential of the isolator is not compromised. This requires that the final snubber adjustment be completed after the vibration isolators are properly installed and the installation approved.
- C. Bracing of Pipes:
1. Branch lines may not be used to brace main lines.

2. Transverse bracing shall be at 40 feet maximum except where a lesser spacing is indicated in the SMACNA tables for bracing of pipes.
  3. Longitudinal bracing shall be at 80 feet maximum except where a lesser spacing is indicated in the tables. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided that it has a capacity equal to or greater than a longitudinal brace. The longitudinal braces and connections must be capable of resisting the additional force induced by expansion and contraction.
  4. A rigid piping system shall not be braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.
  5. Transverse bracing for one pipe section may also act as longitudinal bracing for a pipe section of the same size connected perpendicular to it if the bracing is installed within 24 inches of the elbow or tee.
- D. Suspended Equipment and Piping Cable Method:
1. Cables shall be adjusted to a degree of slackness approved by the Structural Engineer.
  2. Uplift and downward restraint nuts and washers for the Type HST hangers shall be adjusted so that there is a minimum 1/4-inch clearance.

**END OF SECTION**

December 27, 2023

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**SECTION 22 05 53**

**IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Labels.
- E. Lockout devices.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 91 23 - Interior Painting: Identification painting.

**1.03 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - 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.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
- B. Safety Sign Company: [www.safetysignco.com](http://www.safetysignco.com).
- C. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: Black.
  - 2. Letter Height: 1/2 inch.
  - 3. Background Color: Yellow.
  - 4. Plastic: Comply with ASTM D709.

### **2.03 TAGS**

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

### **2.04 PIPE MARKERS**

- A. 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 thick, manufactured for direct burial service.

### **2.05 LABELS**

- A. Description: Aluminum, size 1.9 x 0.75 inches, adhesive backed with printed identification.

### **2.06 LOCKOUT DEVICES**

- A. Lockout Hasps:
  - 1. Manufacturers:
    - a. Anodized aluminum or reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.
- B. Valve Lockout Devices:
  - 1. Steel device preventing access to valve operator, accepting lock shackle.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

### **3.02 INSTALLATION**

- A. Install plastic 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. Identify pumps, heat transfer equipment, tanks, and water treatment devices with 8 x 4 inch plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify valves in main and branch piping with tags.
- I. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction. Install in clear view and align with axis of piping. 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.

**END OF SECTION**



**SECTION 22 07 19**  
**PLUMBING PIPING INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping insulation.
- B. Jackets and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 09 91 23 - Interior Painting: Painting insulation jacket.
- C. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

**1.03 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.
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- C. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2022.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of documented experience.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

### **1.07 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/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
- B. Materials shall not contain pentabrominated diphenyl ethers (PBDEs) in amounts greater than allowed by Washington law.

### **2.02 GLASS FIBER**

- A. Manufacturers:
  - 1. Knauf Insulation; Pipe Insulation ASJ-SSL: [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville; SSL II: [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
  - 4. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - 5. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation: ASTM C547; rigid molded, noncombustible.
  - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 850 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-inches.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
  - 1. Compatible with insulation.
- F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
  - 1. ASTM C195; hydraulic setting on mineral wool.
- G. Indoor Vapor Barrier Finish:
  - 1. Cloth: Untreated; 9 oz/sq yd weight.

2. Vinyl emulsion type acrylic, compatible with insulation, black color.
- H. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
  1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- I. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
  1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- J. ASTM C449/ASTM C449M.

### **2.03 JACKETS**

- A. PVC Plastic.
  1. Manufacturers:
    - a. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. 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: 20 mil.
    - e. Connections: Brush on welding adhesive.
  3. Covering Adhesive Mastic: Compatible with insulation.
    - a. Compatible with insulation.
- B. Aluminum Jacket: ASTM B209/B209M formed aluminum sheet.
  1. Manufacturers:
    - a. Childers Products Co.: [www.fosterproducts.com](http://www.fosterproducts.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Thickness: 0.016 inch sheet.
  3. Finish: Embossed.
  4. Joining: Longitudinal slip joints and 2 inch laps.
  5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  6. Metal Jacket Bands: 3/8 inch wide; 0.02 inch thick aluminum.
  7. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick stainless steel.

## **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. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature:
  - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
  - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. 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.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.
- K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

- L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- M. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.
- N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

### **3.03 SCHEDULES**

- A. Plumbing Systems:
  - 1. Domestic Hot Water Supply:
    - a. Glass Fiber, Rigid, Insulation:
      - 1) Pipe Size Range: Under 2 inch.
      - 2) Thickness: 1 inch.
      - 3) Pipe Size Range: Over 2 inch.
      - 4) Thickness: 1-1/2 inch.
  - 2. Domestic Hot Water Recirculation:
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: All sizes.
      - 2) Thickness: 1 inch.
  - 3. Domestic Cold Water:
    - a. Glass Fiber, Rigid, Insulation:
      - 1) Pipe Size Range: 1 inch and under.
      - 2) Thickness: 1/2 inch.
      - 3) Pipe Size Range: Over 1 inch.
      - 4) Thickness: 1 inch.

**END OF SECTION**

**SECTION 22 10 05**  
**PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Storm water.
  - 4. Flanges, unions, and couplings.
  - 5. Ball valves.
  - 6. Valves.
  - 7. Check valves.
  - 8. Relief valves.
  - 9. Strainers.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.
- C. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
- D. Section 22 05 49 - PLUMBING SEISMIC RESTRAINT.
- E. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- F. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 2015.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- D. ASME B31.9 - Building Services Piping; 2020.
- E. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2021.
- F. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2021.
- G. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- H. ASTM B32 - Standard Specification for Solder Metal; 2020.
- I. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2020.
- J. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2020.

- K. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021.
- L. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2022.
- M. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems; 2020.
- N. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- O. AWWA C651 - Disinfecting Water Mains; 2014.
- P. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2017 (Revised 2018).
- Q. CISPI 301 - 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; 2018.
- R. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
- S. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2019.
- T. NSF 61 - Drinking Water System Components - Health Effects; 2021.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Project Record Documents: Record actual locations of valves.

#### **1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with all applicable local codes and standards.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX.
- 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 REGULATORY REQUIREMENTS**

- A. Perform work in accordance with applicable plumbing code.
- B. Conform to applicable code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.

- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Store pipe on sleepers, a minimum of 4 inches above surrounding grade, at all times.

## **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.

### **2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Cast Iron Pipe: CISPI 301, hubless.
  - 1. Fittings: Cast iron.
  - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies. Mission Heavyweight, Husky 4000, Clamp-All 120 system, Ideal Triden, or approved.

### **2.03 SANITARY SEWER PIPING, ABOVE GRADE**

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, ASTM C1277, neoprene gaskets and stainless steel clamp-and-shield assemblies.

### **2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Copper Pipe: ASTM B42, annealed.
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
  - 2. Joints: AWS A5.8M/A5.8, BCuP silver braze.

### **2.05 DOMESTIC WATER PIPING, ABOVE GRADE**

- A. Copper Tube: 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.
- B. PEX Tube: ASTM F876, SDR 9.
  - 1. Fittings: ASTM F877, brass insert type with metal bands or brass or plastic compression type matching tube dimensions.
  - 2. Application: Final connection to plumbing fixture only limited to individual fixture drops to lavatory, sink, and drinking fountain.

### **2.06 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.



1. Fittings: Cast iron.
2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies. Mission Heavyweight, Husky 4000, Clamp-All 120 system, Ideal Triden, or approved.

## **2.07 FLANGES, UNIONS, AND COUPLINGS**

- A. Unions for Pipe Sizes 3 Inches 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 Size Over 1 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. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## **2.08 GATE VALVES**

- A. Manufacturers:
  1. Hammond Valve Co.; Model IB640/IB641: [www.hammondvalve.com](http://www.hammondvalve.com).
  2. NIBCO, Inc.; T/S-111-LF: [www.nibco.com](http://www.nibco.com).
  3. Milwaukee Valve Company; Model 148/1150: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
  4. Stockham; Model B-100/B-122: [www.stockham.com](http://www.stockham.com).
  5. Apollo Valve; Model 101SLF/101TLF: [www.apollovalves.com](http://www.apollovalves.com).
  6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Up To and Including 3 Inches:
  1. MSS-SP-13, 300PSI CWP, lead free, bronze body and trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.

## **2.09 BALL VALVES**

- A. Manufacturers:
  1. Hammond Valve Co.; Model 8501/8901: [www.hammondvalve.com](http://www.hammondvalve.com).
  2. NIBCO, Inc.; T/S-FP-600A / T/S-585-80-LF: [www.nibco.com](http://www.nibco.com).
  3. Watts; Model FBV-1/B-6000: [www.watts.com](http://www.watts.com).
  4. Stockham; Model S216-BR-R-T: [www.stockham.com](http://www.stockham.com).
  5. Apollo; Model 77CLF: [www.apollovalves.com](http://www.apollovalves.com).
  6. Milwaukee Valve Company; Model BA-125/BA-100: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
  7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing

box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

C. Up to and including 3 inches:

1. MSS SP-110, 600 PSI-CWP, bronze, two piece body, lead free brass ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle solder or threaded ends.

## 2.10 BUTTERFLY VALVES

A. Manufacturers:

1. Hammond Valve; Model 6200: [www.hammondvalve.com](http://www.hammondvalve.com).
2. NIBCO, Inc.; Model LD-2000: [www.nibco.com](http://www.nibco.com).
3. Watts; Model BF-03: [www.watts.com](http://www.watts.com).
4. Stockham; Model LG-712: [www.stockham.com](http://www.stockham.com).
5. Milwaukee Valve Company; Model "C" Series: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
6. Apollo Valve; Model LD141 Series: [www.apollovalves.com](http://www.apollovalves.com).
7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction 3 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, aluminum bronze disc, resilient replaceable EPDM seat, lug ends, extended neck, 10 position lever handle.

C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

## 2.11 FLOW CONTROLS

A. Manufacturers:

1. NIBCO, Inc.; Model T/S-1805-LF: [www.nibco.com](http://www.nibco.com).
2. ITT Bell & Gossett: [www.bellgossett.com](http://www.bellgossett.com).
3. Griswold Controls: [www.griswoldcontrols.com](http://www.griswoldcontrols.com).
4. Taco, Inc.: [www.taco-hvac.com](http://www.taco-hvac.com).
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. 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.

C. 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.

## 2.12 SWING CHECK VALVES

A. Manufacturers:

1. Hammond Valve; Model IB940/IR1124: [www.hammondvalve.com](http://www.hammondvalve.com).
2. NIBCO, Inc.; T/S-413-Y-LF / F-938-33: [www.nibco.com](http://www.nibco.com).
3. Stockham; Model B-320/G-931: [www.stockham.com](http://www.stockham.com).
4. Milwaukee Valve Company; Model F-2974: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).

5. Apollo Valve; Model 161TLF/910F: [www.apollovalves.com](http://www.apollovalves.com).
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up to 3 Inches:

1. 1, Class 125, lead free bronze body, cap and swing disc with PTFE seat, solder or threaded ends.

C. Over 3 Inches:

1. MSS SP-136, Class 125, iron body, stainless steel disc, renewable disc seal and seat, flanged ends.

### 2.13 SPRING LOADED CHECK VALVES

A. Manufacturers:

1. Hammond Valve; IR9354: [www.hammondvalve.com](http://www.hammondvalve.com).
2. NIBCO, Inc.; Model F-910-LF: [www.nibco.com](http://www.nibco.com).
3. Milwaukee Valve Company; Model Series 1800: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
4. Apollo Valve; Model 910WB: [www.apollovalves.com](http://www.apollovalves.com).
5. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Class 125, globe style, iron body, bronze trim, stainless steel springs, bronze disc, seals, flanged ends.

### 2.14 RELIEF VALVES

A. Pressure Relief:

1. Manufacturers:
  - a. Watts Regulator Company: [www.wattsregulator.com](http://www.wattsregulator.com).
  - b. Cash-Acme: [www.cashacme.com](http://www.cashacme.com).
  - c. Zurn/Wilkins: [www.zurn.com](http://www.zurn.com).
  - d. Apollo Valve: [www.apollovalves.com](http://www.apollovalves.com).
  - e. Substitutions: See Section 01 60 00 - Product Requirements.
2. AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure Relief:

1. Manufacturers:
  - a. Watts Regulator Company: [www.wattsregulator.com](http://www.wattsregulator.com).
  - b. Cash-Acme: [www.cashacme.com](http://www.cashacme.com).
  - c. Zurn/Wilkins: [www.zurn.com](http://www.zurn.com).
  - d. Apollo Valve: [www.apollovalves.com](http://www.apollovalves.com).
  - e. Substitutions: See Section 01 60 00 - Product Requirements.
2. AGA Z21.22 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.

## 2.15 STRAINERS

- A. Manufacturers:
  - 1. Watts Regulator Company: [www.wattsregulator.com](http://www.wattsregulator.com).
  - 2. Hammond Valve: [www.hammondvalve.com](http://www.hammondvalve.com).
  - 3. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
  - 4. Apollo: [www.apollovalves.com](http://www.apollovalves.com).
  - 5. Stockham: [www.stockham.com](http://www.stockham.com).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Size 2 inch and Under:
  - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
  - 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
  - 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
- D. Size 5 inch and Larger:
  - 1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

## 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. Refer to Section 22 05 16.

- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Establish elevations of buried piping outside the building to ensure not less than 2 ft of cover.
- J. Provide tracer wire over top of piping.
  - 1. Construction:
    - a. Conductor: Solid or stranded copper per spec ASTM B3.
    - b. Insulation: High Molecular Weight Polyethylene (HMWPE) ASTM D1248. Various insulation colors dependant on usage.
    - c. Temperature: 70 degrees C dry and wet.
    - d. Voltage: 20 and 30 Mil = 30 to 300 volts. 45 Mil = 600 volts.
- K. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- M. Provide support for utility meters in accordance with requirements of utility companies.
- N. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
- O. Excavate in accordance with specifications.
- P. Backfill in accordance with specifications.
- Q. Install valves with stems upright or horizontal, not inverted. Refer to Section 22 05 23.
- R. Install water piping to ASME B31.9.
- S. Sleeve pipes passing through partitions, walls, and floors.
- T. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.
  - 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 other 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 or sheet lead packing between hanger or support and piping.
  - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

10. Provide hangers adjacent to motor-driven equipment with vibration isolation; refer to Section 22 05 48.
11. Support cast iron drainage piping at every joint.
12. Support of pipe tubing and equipment is to be accomplished by means of engineered products specific to each application. Makeshift field devised methods will not be allowed.

### **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 gate 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 lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- F. Provide spring-loaded check valves on discharge of water pumps.
- G. 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 1/4 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 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.

### **3.07 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 reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
  2. Provide 18 gage, 0.0478-inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

**END OF SECTION**

**SECTION 22 10 06**  
**PLUMBING PIPING SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Floor drains and floor sinks.
- B. Cleanouts.
- C. Hose bibbs.
- D. Hydrants.
- E. Refrigerator valve and recessed box.
- F. Water hammer arrestors.
- G. Trap primers.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.
- C. Section 22 30 00 - Plumbing Equipment.
- D. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ASME A112.6.3 - Floor and Trench Drains; 2019.
- D. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2008 (Reaffirmed 2012).
- E. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2017.
- F. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011 (Reaffirmed 2016).
- G. NSF 61 - Drinking Water System Components - Health Effects; 2021.
- H. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- I. PDI-WH 201 - Water Hammer Arresters; 2017.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Certificates: Certify that grease interceptors meet or exceed specified requirements.
- E. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.



- F. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.
- G. Operation Data: Indicate frequency of treatment required for interceptors.
- H. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Loose Keys for Outside Hose Bibbs: Two.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

### **1.06 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. Roof Drains:
  - 1. Manufacturers:
    - a. Zurn Industries, Inc.: [www.zurn.com](http://www.zurn.com).
    - b. Wade: [www.wadedrains.com](http://www.wadedrains.com).
    - c. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).
    - d. MIFAB Inc.: [www.mifab.com](http://www.mifab.com)
    - e. Sioux Chief; Model 868-i: [www.siouxchief.com](http://www.siouxchief.com).
    - f. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Assembly: ASME A112.6.4.
  - 3. Body: Lacquered cast iron with sump.
  - 4. Strainer: Removable cast iron dome with vandal proof screws.
  - 5. Accessories: Coordinate with roofing type, refer to Section \_\_\_\_\_.
    - a. Membrane flange and membrane clamp with integral gravel stop.
    - b. Adjustable under deck clamp.
    - c. Roof sump receiver.
    - d. Waterproofing flange.
    - e. Controlled flow weir.
    - f. Leveling frame.
    - g. Adjustable extension sleeve for roof insulation.

- h. Perforated or slotted ballast guard extension for inverted roof.
  - i. Perforated stainless steel ballast guard extension.
- B. Floor Drain (FD-1):
- 1. Manufacturers:
    - a. Jay R. Smith Manufacturing Company; Model 2005-A/2005-B: [www.jayrsmith.com](http://www.jayrsmith.com).
    - b. MIFAB Inc.: [www.mifab.com](http://www.mifab.com).
    - c. Wade: [www.wadedrains.com](http://www.wadedrains.com).
    - d. Zurn Industries, Inc.: [www.zurn.com](http://www.zurn.com).
    - e. Sioux Chief Finish Line; Model 833-NR/833-NQ: [www.siouxchief.com](http://www.siouxchief.com).
    - f. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.
- C. Floor Drain (FD-2):
- 1. Manufacturers:
    - a. Jay R. Smith Manufacturing Company; Model 2110/2130: [www.jayrsmith.com](http://www.jayrsmith.com).
    - b. MIFAB Inc.: [www.mifab.com](http://www.mifab.com).
    - c. Wade: [www.wadedrains.com](http://www.wadedrains.com).
    - d. Zurn Industries, Inc.: [www.zurn.com](http://www.zurn.com).
    - e. Sioux Chief Finish Line; Model 860-i: [www.siouxchief.com](http://www.siouxchief.com).
    - f. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable cast iron strainer with acid resistant coating.
- D. Prefabricated Trench Drain (TD-1): Trench drain system assembled from factory fabricated, polymer concrete castings in standard lengths and variable depths, with integral joint flanges and integral grating support rails; includes joint gaskets and grating.
- 1. Basis of Design: ACO Polymer Products, Inc., KlassikDrain: [www.acousa.com](http://www.acousa.com).
  - 2. Sioux Chief; 865 Series: [www.siouxchief.com](http://www.siouxchief.com); See Schedule on Drawing.
  - 3. Load Class: DIN 19580, Class C.
  - 4. ADA Standards compliant.
  - 5. Chemical Resistant.
  - 6. Grating Material and Style: Perforated stainless steel.
  - 7. Grating Material and Style: Slotted stainless steel.
  - 8. Accessories:
    - a. Foul air trap.
    - b. Oval to round pipe connection.

- c. Vertical outlet strainer.

### **2.03 CLEANOUTS**

#### **A. Manufacturers:**

1. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).
2. MIFAB Inc.: [www.mifab.com](http://www.mifab.com).
3. Wade: [www.wadedrains.com](http://www.wadedrains.com).
4. Zurn Industries, Inc.: [www.zurn.com](http://www.zurn.com).
5. Sioux Chief Finish Line: [www.siouxchief.com](http://www.siouxchief.com).
6. Substitutions: See Section 01 60 00 - Product Requirements.

#### **B. Cleanouts at Exterior Surfaced Areas (CO-1):**

1. Manufacturers:
  - a. Jay R. Smith Manufacturing Company; Model 4250: [www.jayrsmith.com](http://www.jayrsmith.com).
  - b. Sioux Chief; Model 834-DNR: [www.siouxchief.com](http://www.siouxchief.com).
2. Round cast nickel bronze access frame and non-skid cover.

#### **C. Cleanouts at Interior Finished Floor Areas (CO-2):**

1. Lacquered cast iron body with anchor flange, 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 (CO-3):**

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 (CO-5):** 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.jayrsmith.com](http://www.jayrsmith.com).
2. MIFAB Inc.: [www.mifab.com](http://www.mifab.com).
3. Zurn Industries, Inc.: [www.zurn.com](http://www.zurn.com).
4. Woodford Manufacturing Co.: [www.woodfordmfg.com/Woodford](http://www.woodfordmfg.com/Woodford)
5. Substitutions: See Section 01 60 00 - Product Requirements.

#### **B. Interior Hose Bibbs:**

1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with lockshield and removable key, vacuum breaker in conformance with ASSE 1011.

## 2.05 HYDRANTS

### A. Manufacturers:

1. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).
  - a. MIFAB Inc.: [www.mifab.com](http://www.mifab.com).
  - b. Zurn Industries, Inc.: [www.zurn.com](http://www.zurn.com).
  - c. Woodford Manufacturing Co.: [www.woodfordmfg.com/Woodford](http://www.woodfordmfg.com/Woodford)
  - d. Substitutions: See Section 01 60 00 - Product Requirements.

### B. Wall Hydrants:

1. Manufacturers:
  - a. Woodford Manufacturing Co.; Model B67C: [www.woodfordmfg.com/Woodford](http://www.woodfordmfg.com/Woodford)
  - b. Zurn Industries, Inc.; Model Z-1320-C: [www.zurn.com](http://www.zurn.com).
2. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

## 2.06 WASHING MACHINE BOXES AND VALVES

### A. Box Manufacturers:

1. Sioux Chief; 696 Series: [www.siouxchief.com](http://www.siouxchief.com).
2. Substitutions: See Section 01 60 00 - Product Requirements.

- ### B. Description:
- Plastic preformed rough-in box with brass long shank valves with wheel handles, socket for 2 inch waste, slip in finishing cover.

## 2.07 REFRIGERATOR VALVE AND RECESSED BOX

### A. Box Manufacturers:

1. Sioux Chief; 696 Series: [www.siouxchief.com](http://www.siouxchief.com).

- ### B. Description:
- Plastic preformed rough-in box with brass valves with wheel handle, slip in finishing cover.

## 2.08 WATER HAMMER ARRESTORS

### A. Manufacturers:

1. Jay R. Smith Manufacturing Company; Model Hydrotol: [www.jayrsmith.com](http://www.jayrsmith.com).
2. MIFAB Inc.: [www.mifab.com](http://www.mifab.com).
3. Zurn Industries, Inc.: [www.zurn.com](http://www.zurn.com).
4. Precision Plumbing Products, Inc.: [www.ppcinc.net](http://www.ppcinc.net).
5. Sioux Chief: [www.siouxchief.com](http://www.siouxchief.com).
6. Substitutions: See Section 01 60 00 - Product Requirements.

### B. Water Hammer Arrestors:

1. Stainless steel construction, bellows 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.

## **2.09 TRAP PRIMERS**

- A. Manufacturers:
  - 1. Precisions Products (PPP); Model: P-1/P-2.
- B. Accessories: Provide distribution unit for multiple design connections.

## **2.10 HEAT TRACING (FREEZE PROTECTION)**

- A. Manufacturers: Raychem XL, or Bylin.
  - 1. Raychem; Model XL-Trace: [www.tycothermal.com](http://www.tycothermal.com).
  - 2. Bylin: [www.bylinusa.com](http://www.bylinusa.com).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Application: Traps in crawl space.
- C. Controls: DigiTrace AMC-1A ambient-sensing thermostat.

## **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 portable 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, and interior and exterior hose bibbs.
- F. Pipe relief from backflow preventer to nearest drain.
- G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories sinks washing machine outlets.
- H. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.
- I. Install service shut-off valve for trap primers.

**END OF SECTION**

**SECTION 22 40 00**  
**PLUMBING FIXTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water closets.
- B. Lavatories.
- C. Sinks.
- D. Service sinks.
- E. Electric water coolers.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 41 00 - Architectural Wood Casework: Preparation of counters for sinks; lavatory tops.
- B. Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.
- C. Section 11 40 00 - Foodservice Equipment: Food service sinks.
- D. Section 11 53 00 - Laboratory Equipment: Laboratory sinks.
- E. Section 22 10 05 - Plumbing Piping.
- F. Section 22 10 06 - Plumbing Piping Specialties.
- G. Section 22 30 00 - Plumbing Equipment.
- H. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- B. IAPMO Z124 - Plastic Plumbing Fixtures; 2017.
- C. ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment; 2014.
- D. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2013.
- E. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- F. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- G. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures; The American Society of Mechanical Engineers; 2008 (R2011).
- H. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018.
- I. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2017.
- J. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures; 1994 (R2009).

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Samples: Submit two lavatory supply fittings.
- D. Manufacturer's Instructions: Indicate installation methods and procedures.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- F. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- G. Waterless Urinals: Submit recommended frequency of maintenance and parts replacement, methods of cleaning, sources of replacement supplies and parts.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Faucet Washers: One set of each type and size.
  - 3. Extra Lavatory Supply Fittings: One set of each type and size.
  - 4. Extra Shower Heads: One of each type and size.
  - 5. Extra Toilet Seats: One of each type and size.
  - 6. Flush Valve Service Kits: One for each type and size.
  - 7. Extra Waterless Urinal Trap Seals/Supplies: Provide one year's worth of replacement trap seal parts or supplies, based on normal, expected use of facility of this type.

#### **1.05 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

#### **1.06 QUALITY ASSURANCE**

- A. Perform work in accordance with applicable codes.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of this section with minimum three years experience.

#### **1.07 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

### **1.08 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

### **1.09 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept fixtures on site in factory packaging. Inspect for damage.
- C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

### **1.10 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

## **PART 2 PRODUCTS (SEE DRAWINGS FOR FIXTURE SCHEDULE)**

### **2.01 LAVATORY INSULATION KIT**

- A. Manufacturers:
  - 1. True Bro; Model: Lav. Guard.
  - 2. Substitutions: Section 01 60 00 - Product Requirements.
  - 3. Product Description: Where Lavatories are noted to be insulated for ADA compliance, furnish the following: Safety Covers conforming to ANSI A177.1 and consisting of insulation kit of molded closed cell vinyl construction, 3/16 inch thick, white or gray color, for insulating tailpiece, P-trap, valves, and supply piping. Furnish with weep hole and angle valve access covers.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- C. Verify that electric power is available and of the correct characteristics.
- D. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

### **3.02 PREPARATION**

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

### **3.03 INSTALLATION**

- A. Install work in accordance with all applicable codes.
- B. Install each fixture with trap, easily removable for servicing and cleaning.



- C. Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.
- D. Install components level and plumb.
- E. Install and secure fixtures in place with wall supports and bolts.
- F. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture.
- G. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
- H. For ADA accessible water closets, install flush valve with handle to wide side of stall.

### **3.04 INTERFACE WITH WORK OF OTHER SECTIONS**

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

### **3.05 ADJUSTING**

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

### **3.06 PROTECTION**

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

### **3.07 SCHEDULES**

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
  - 1. Water Closet:
    - a. Standard: 15 inches to top of bowl rim.
    - b. Accessible: 18 inches to top of seat.
  - 2. Water Closet Flush Valves:
    - a. Standard: 11 inches min. above bowl rim.
    - b. Recessed: 10 inches min. above bowl rim.
  - 3. Lavatory:
    - a. Standard: 31 inches to top of basin rim.
    - b. Accessible: 34 inches to top of basin rim.
  - 4. Drinking Fountain:
    - a. Child: 30 inches to top of basin rim.
    - b. Standard Adult: 40 inches to top of basin rim.

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- c. Accessible: 36 inches to top of spout.

**END OF SECTION**

**SECTION 23 00 00**  
**BASIC HVAC REQUIREMENTS**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This Section specifies the basic requirements for all Contractor installed equipment. It applies to all sections included in Division 23. The requirements herein are an expansion upon the requirements of Division 1.
- B. Provide all materials, labor and equipment required to install complete and fully operational HVAC systems as indicated by the contract drawings and this specification.
- C. Obtain and pay for all permits, licenses, fees and taxes applicable to this project as required by law.
- D. Cooperate with other trades in furnishing material and information required for installation and operation of mechanical items.
- E. Requirements for the following are included:
  - 1. Related work (other Contract Documents and specification sections) that must be combined with the requirements of this Section.
  - 2. Design performance.
  - 3. Delivery, storage, and handling.
  - 4. Quality assurance and standards.
  - 5. Submittals.
  - 6. Product quality, basic type, and finishes.
  - 7. Equipment identification.
  - 8. Design criteria.
  - 9. Excavation and backfill.
  - 10. Installation.
  - 11. Mounting and shimming.
  - 12. Inspection.
  - 13. Safety considerations.
  - 14. Cleaning, startup, and adjustments.

**1.02 RELATED WORK**

- A. This general section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for the project equipment and systems:
  - 1. Division 1 sections included in this Project specifications.
  - 2. The Contract.
  - 3. General and specific mechanical specifications and drawings included in the project.

### 1.03 DEFINITIONS

- A. "Indicated": Refers to graphic representations, notes or schedules in the Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents.
  - 1. Terms such as "shown", "noted", "scheduled", and "specified", are used to notify or help the user to locate reference. Location is not limited.
- B. "Directed": Terms such as "directed", "Requested", "authorized", "selected", "approved", "required", and "permitted" mean directed by Architect/Engineer, approved by Architect/Engineer and similar phrases.
- C. "Approved": When used in conjunction with Architect/Engineer's action on contract submittals, applications, requests, is limited to Architect/Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- D. "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 Work.
- E. "Furnish": Means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation and similar operations.
- F. "Install": Describes operations at Project site including actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, supporting, isolating, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.
- G. "Provide": Means to furnish and install.
- H. "Installer": A contractor, or another entity engaged by the contractor, either as an employee, subcontractor, or contractor of a lower tier, to perform a particular construction activity including installation, erection, application or similar operations.
  - 1. Installers are required to be experienced in operations they are engaged to perform.
  - 2. The term "experience" means having successfully completed a minimum of three previous projects similar in scope and size to this Project and within the time frame indicated in the "Quality Assurance" section of the Specifications. In addition, it means being familiar with special requirements indicated and having complied with requirements of authorities having jurisdiction.
- I. "Project Site": Is defined as the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project.

### 1.04 DESIGN PERFORMANCE

- A. Compliance by the Contractor and/or Vendor with the provisions of this Specification does not relieve him of the responsibilities of furnishing equipment and materials of proper design, mechanically suited to meet operating guarantees at the specified service conditions.

### 1.05 SUBMITTALS

- A. Product Data: Submit complete sets of manufacturer's product data in .PDF format for approval. All submittals are to be received in no more than (3) three packages. See Division 1 for further information regarding submittal requirements. Literature submitted shall clearly indicate the model number, capacity, rated operating conditions, noise levels, size, weight, support requirements, rough-in data and dimensions, electrical power requirements, wiring diagrams, utility (fuel, air, cooling water, etc.) requirements, and options furnished. Submittals shall include, but are not necessarily limited to the following;
1. HVAC: Split-system heat pump; energy recovery unit; fans; piping; valves; supports and anchors; louvers; grilles; diffusers; controls and the like.
  2. Calculations: Provide for factory selection and sizing of all noise attenuation; vibration; isolation; thermal expansion and seismic restraints; with good engineering practice. Include design criteria used and assumptions made.
- B. Operation and Maintenance Data: Submit three complete sets of manufacturer's literature bound in a three ring binder for approval. Data shall include installation, start-up, and maintenance instructions, parts lists, and wiring diagrams. Include all material on a CD-ROM or USB device.
- C. Substitutions: System design was based upon the equipment and materials listed on the drawings and specifications herein. At contractor's option, another manufacturer's equipment of similar quality, capacity and features may be submitted for prior approval per Section 01 60 00. Prior permission to substitute does not relieve the contractor of the responsibility of including this information in the bound submittal packages.
- D. When specified, prepare and submit shop drawings and prints of plans, sections, details and diagrams to minimum scale (1/4" = 1'-0"). Mechanical and pump rooms shall be 1/2" = 1'-0" minimum scale. Drawings shall be coordinated, dimensioned and indicate equipment, recommended clearances, pipe, duct, fire protection and electrical in relation to architectural and structural features. Include minor piping, drains, valves and the like. Indicate exact locations and elevations of valves, piping specialties, access doors, dampers and the like.
- E. Shop drawings shall be created and submitted on AutoCAD release 2017 or later.
- F. Air Balancing Report: Provide .PDF reports stating the design air and hydronic flow requirements per, air inlet and air outlet and the final adjusted airflow volume for the same.

### 1.06 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the provisions of the following codes, standards and specifications, except where more stringent requirements are shown or specified:
1. State of Washington "IBC".
  2. State of Washington "IMC".
  3. State of Washington "UPC".

4. State of Washington "IFC".
  5. ANSI/ASHRAE 90 - "Energy Efficient Design of New Buildings...."
  6. ANSI/ASHRAE 62 - "Ventilation for Acceptable Indoor Air Quality."
  7. NEBB - "Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems."
  8. ANSI B31.9 "Building Service Piping".
  9. SMACNA - "HVAC Duct Construction Standards".
  10. NFPA 90B.
- B. Wherever the specification call for or describe materials or construction of better quality or larger sizes than are required by the above rules and regulations, these specifications shall govern. Should there be any direct conflict between the above rules and regulations and the specifications the rules shall govern.
- C. Drawings: All drawings are diagrammatic and show general design, arrangement, and extent of the systems. Do not scale drawings for rough-in dimensions, nor use as shop drawings.
- D. Installer Qualifications: Company specializing in performing the work required with a minimum of five years documented experience.
- E. Contractor shall furnish and install all work in accordance with manufacturers' recommendations and instructions.
- F. Equipment shall have U.L. label listing.

#### **1.07 MATERIALS AND SUBSTITUTIONS**

- A. Shop drawings of proposed material and equipment that differ from the specified basis of design materials and equipment shall be accompanied by shop drawings that define changes physical layout and performance. These drawings shall show modifications of architectural, plumbing, electrical and mechanical work required by the proposed materials and equipment such as relocation of flues, drains, piping, ducts, revised electrical circuits, relocation of roof or wall penetrations, revised foundations and the like.

#### **1.08 DELIVERY, STORAGE AND PROTECTION**

- A. Delivery: Deliver to site with manufacturer's labels intact and legible.
- B. Preparation for shipment:
1. The Contractor shall be solely responsible for the adequacy of the Preparation for Shipment provisions employed with respect to materials and application.
  2. One complete set of Installations, Operating and Maintenance Instructions shall be packed and shipped with the equipment. This set is in addition to the sets that are to be sent directly to the Owner.
- C. Handling: Avoid damage. Comply with manufacturer's installation instruction requirements for rigging, unloading and transporting units.

- D. Storage: Inside protected from weather, dirt and construction dust. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping. Cap all pipe ends. Taping pipe ends is not adequate or allowable.

#### **1.09 PROJECT CONDITIONS**

- A. General: Provide products which are compatible with other portions of the work and provide products with the proper power characteristics and similar adaptations for the project.
- B. Arrangement: Arrange ductwork and piping parallel with primary lines of the building construction and with a minimum 7 feet overhead clearance in unfinished equipment rooms where possible. Conceal all piping and ductwork where possible unless indicated otherwise. Locate operating and control equipment properly to provide easy access for operation and maintenance. Give right-of-way to piping which must be sloped for drainage. Set all equipment level or as recommended by manufacturer.
- C. Coordination: Where several elements of the work must be sequenced and positioned in order to fit the available space, prepare shop drawings showing the actual physical dimensions (at accurate scale) required for installation and submit prior to purchase/fabrication/installation of any of the elements involved in the coordination.

#### **1.10 STANDARDS**

- A. General: Provide all new materials and equipment, identical to apparatus or equipment in successful operation for a minimum of five years. Provide materials of comparable quality omitted here but necessary to complete the work. Maximum allowable variation from stated capacities, minus 5% to plus 10% as approved in each case.
- B. Governing Standards: The following are typical standards generally referenced in these specifications and identified by their acronym. Federal Specifications (FS), American Society for Testing Materials (ASTM), American National Standards Institute (ANSI), Manufacturer's Standardization Society of the Valve and Fitting Industry, Standard Practice (MSS SP-69), Cast Iron Soil Pipe Institute (CISPI), Underwriters Laboratory (UL) numbers are given.
- C. Wherever the specifications call for or describe materials or construction of better quality or larger sizes than are required by the above standards or code, these specifications shall govern. For any direct conflict between the specifications and the above standards or codes, the standards and codes shall govern.

#### **1.11 WARRANTIES**

- A. Comply with Division 01 section - Project Closeout.
- B. Equipment under this section of the specifications shall be guaranteed for a period of one year from date of acceptance against defective materials, design, and workmanship.
- C. Contractor shall leave entire installation in complete working order and free from defects in material, workmanship, or finish.

- D. The HVAC contractor, by accepting these specifications and by signing the sub-contract, shall guarantee the following:
1. All equipment, material, and workmanship against defects in material and workmanship for a period of one (1) year from date of final acceptance by the Owner. The HVAC contractor shall furnish written guarantee to replace defective work and materials furnished under this section, at no cost to the Owner, for this one (1) year period.
  2. That equipment and material will produce the results specified.

## **PART 2 PRODUCTS (NOT USED)**

## **PART 3 EXECUTION**

### **3.01 LAYOUT AND COORDINATION**

- A. Site Examination: Before starting work, carefully examine site and all Contract Drawings. Become thoroughly familiar with conditions governing work on this project. Verify all indicated elevations, building measurements, rough-in dimensions and equipment locations before proceeding with any work.
- B. Utility Locations: The location of all utilities, wires, conduits, pipes, ducts, or other service facilities are shown in a general way only on the drawings and in some instances are taken from existing drawings. Ascertain whether any additional facilities other than those shown on the plans may be present and determine the exact location and elevations of all utilities prior to commencing installation.
- C. The inclusion and proper location of supports, pads, sleepers, openings, anchoring and the like provided by others is the responsibility of the contractor under this section. Cutting and/or boring shall be permitted under this section only with the written approval of the Architect.
- D. It shall be the contractor's responsibility to coordinate and have provided by other trades where not covered by the Contractor's work scope of work all electrical wiring and power to equipment, controls and devices, all plumbing and any other work from other trades as required to provide fully functional HVAC systems per contract documents.
- E. Discrepancies: Any error, conflict or discrepancy in Drawings, Specifications and/or existing conditions shall be reported immediately. Do not proceed with any questionable items of work until clarification of same has been made. Should rearrangement or re-routing of piping or ductwork be necessary, provide for approval the simplest layout possible for that particular portion of the work. Under no circumstances shall beams, girders, footings or columns be cut for mechanical items. Casting of pipes into concrete is prohibited unless so shown on Drawings.
- F. The Contractor shall cooperate with others to avoid interferences and delays in the construction work.
- G. Interference as a result of poor coordination or lack of cooperation with other trades shall be corrected at the Contractor's expense.



### **3.02 CONTINUITY OF EXISTING SERVICES**

- A. Existing water, power, heat, ventilation, air conditioning and other services shall remain in service during new construction work. Coordinate any interruption in service during new construction work. Coordinate any interruption of these services with the Owner's representative a minimum of twenty-four (24) hours in advance.
- B. Protect from damage active utilities existing and evident by reasonable inspection of the site whether shown or not on the Drawings. Protect, relocate or abandon utilities encountered in the work which were not shown on the Drawings or evident by inspection of the work as directed by the Architect. Maintain continuity of all utility services to existing buildings.

### **3.03 CUTTING AND PATCHING**

- A. General: Perform cutting and patching in accordance with Division 1.
- B. Protection: During cutting and patching, protect adjacent installations. Provide temporary barriers to prevent the spread of dust and dirt outside of the immediate work area.
- C. Repair: Patch finished surfaces and building components using new materials to match the existing.
- D. Inspection: Upon written direction from the Architect, uncover and restore work to provide for observation of concealed work.

### **3.04 EQUIPMENT REMOVAL**

- A. All removed equipment is the property of the Contractor unless indicated otherwise. Disconnect and remove all such equipment from the property. Cap all piping in walls, below floors, and/or above ceilings in finished rooms.
- B. Where equipment is to be reused, reconnect piping, wiring and/or controls to allow this equipment to function as it had prior to this renovation unless indicated otherwise.

### **3.05 MECHANICAL EQUIPMENT WIRING**

- A. Provide all motor starters, control devices, and wiring complete from power source indicated on Drawings.
- B. Equipment and systems shown on the Drawings and/or specifications, are based upon requirements of specific manufacturers which are intended as somewhat typical of several makes which may be approved. Provide all field wiring and/or devices necessary for a complete and operable system controls for the actual selected equipment/system.

### **3.06 INSTALLATION**

- A. Manufacturer's directions shall be followed in cases where the manufacturers of materials and equipment used in this contract furnish directions covering points not shown in the drawings and specifications.

- B. Locating and Positioning Equipment: Observe all Codes and Regulations and good common practice in locating and installing mechanical equipment and material so that completed installation presents the least possible hazard. Maintain recommended clearances for repair and service to all equipment.
- C. Anchorage: Anchor and/or brace all mechanical equipment, piping and ductwork to resist displacement due to seismic action, include snubbers on equipment mounted on spring isolators.
- D. Where mounting heights or locations are not identified, install systems, equipment and materials to provide maximum headroom.
- E. Provide clearance for installation of insulation and access to valves, fittings, damper actuators, etc. on pipe and duct systems.
- F. Install systems, materials and equipment giving right of way to systems required to be installed at a specific slope or operation by gravity.
- G. Provide condensate drain piping to over nearest floor drain for all coils, split-system heat pump, domestic water heaters and the likes.
- H. Provide all sheaves required for final air balance. Contractor shall not make assumptions or exceptions concerning the number of sheave replacements or adjustments necessary to meet the design requirements. Balance all HVAC systems to provide the amount of air indicated at each diffuser, grille or register.
- I. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and the fan has been test run under observation. Fans shall not be used during construction unless specifically authorized by the Owner and reviewed by the Engineer.
- J. 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.
- K. Installation shall be in accordance with the requirements of the equipment manufacturer, including special requirements for seismic restraints.
- L. Equipment Manufacturer's Responsibility and Services:
  - 1. A manufacturer's representative for major equipment and operating systems shall be provided as necessary to assist the Contractor during installation, and to provide written certification that the equipment has been installed as specified and in accordance with the manufacturer's representative.
  - 2. The manufacturer's representative shall provide the initial startup of equipment in the presence of the Owner.
    - a. Provide a pre-start check of all piping, valves, control devices, control panels, and equipment.
    - b. Calibrate and adjust equipment and controls for operation at the specified design and conditions.
    - c. Provide a record of all startup events noting problems and their resolution.

- d. Provide a record of all set points for operational controls and devices.
3. Upon the completion of the equipment startup, provide instructional time with the Owner's personnel to review the operations and maintenance manuals and perform each step necessary for startup, shutdown, troubleshooting, and routine maintenance. The instructional time shall be scheduled through the Owner.
4. Upon completion of the inspections, startup, testing, and checkout procedures, the equipment manufacturer shall submit written notice to the Owner that the units are ready for use by the Owner. Provide a certificate of calibration for all equipment.

### **3.07 MOUNTING AND SHIMMING**

- A. Mount equipment as shown on the Drawings. Provisions for mounting special equipment on spring isolators, snubbers, and inertia bases are specified in Section 23 05 48, Vibration Isolation and Sound and Seismic Controls for HVAC Piping and Equipment.
- B. Level the equipment by means of 304 stainless steel wedges (stainless steel plates and stainless steel shims). Wedge taper shall not be greater than 1/4 inch per foot. Use double wedges to provide a level bearing surface for the equipment. Secure each pair of wedges in their final positions with one tack weld on each side after leveling is complete. Wedging shall be executed in a manner that will prevent a change in level or springing of the Baseplate when the anchor bolts are tightened.
  1. Adjust rotating equipment assemblies such that the driving units are properly aligned, plumb and level with the driven units and all interconnecting shafts and couplings.
  2. All rotating equipment shall be checked for proper alignment with dial indicators or laser after completion of grouting. The alignment must be within the tolerances required by the equipment manufacturer. The final alignment check shall be witnessed by the Owner.

### **3.08 INSPECTION**

- A. The Contractor shall inspect his work to ensure the installation and workmanship is in accordance with these specifications and acceptable industry standards for the work being done.
- B. All materials, equipment, and workmanship shall be subject to inspection at any time by the Owner. Contractor shall correct any work, materials, or equipment not in accordance with the Contract Documents.
- C. Any work enclosed or covered up prior to inspection and testing shall be uncovered. After the work has been tested, inspected and accepted, repair as necessary to return disturbed work to its original and proper condition at no cost to the Owner.

### **3.09 SAFETY CONSIDERATIONS**

- A. All equipment shall be installed with suitable access clearances that satisfy OSHA and code requirements for maintenance or removal of replaceable parts and components, and with

necessary unions or flanges to perform the maintenance or removal without removing the connecting appurtenances.

- B. Where equipment requiring periodic maintenance cannot be reached by normal walkways because of interference with ductwork, piping, or other obstructions the Contractor shall notify the Owner and propose an alternate safe means of access. These may include construction of an overhead platform with stairway or ladder ends and safety railings or handholds, or walk-through duct plenums with hinged access doors, or as required to meet OSHA standards for safe maintenance procedures.

### **3.10 CLEANING, START-UP, AND ADJUSTING**

- A. The Contractors shall be responsible for proper operation of all systems, minor subsystems, and services provided under this section. He shall coordinate start-up procedures, calibration, and system checkout with all project managers. Any system operational problems shall be diagnosed; all correctional procedures shall be initiated as required to bring out the system into compliance with the design, and the problem then shall be rechecked to verify that the system operates normally.
- B. Thoroughly clean all parts of the installation at the completion of the work. The Contractor shall clean up and remove from the premises all refuse material, crates, and rubbish arising from his work. Remove, clean, and reinstall all filters. Belt-drive tensions and alignments shall be checked. All motors and bearings shall be lubricated in accordance with the manufacturer's service manuals prior to equipment start-up. Provide a lubrication schedule for every item of equipment furnished under this section. The schedule shall include the type of lubricant and the application frequency.

**END OF SECTION**

**SECTION 23 05 48**

**VIBRATION ISOLATION AND SOUND AND SEISMIC CONTROLS FOR HVAC PIPING AND  
EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Vibration-isolated equipment support bases.
- B. Vibration isolators.
- C. Seismic restraint systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 07 92 00 - Joint Sealants.
- C. Section 23 05 49 - HVAC SEISMIC RESTRAINT.
- D. Section 23 31 00 - HVAC Ducts and Casings.
- E. Section 23 33 00 - Air Duct Accessories.

**1.03 REFERENCE STANDARDS**

- A. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016.
- B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.
- C. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment; 2002.
- D. FEMA 413 - Installing Seismic Restraints for Electrical Equipment; 2004.
- E. FEMA 414 - Installing Seismic Restraints for Duct and Pipe; 2004.
- F. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage; 2012.
- G. MFMA-4 - Metal Framing Standards Publication; 2004.
- H. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2008.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data:
  - 1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
  - 2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.
- C. Shop Drawings:
  - 1. Provide schedule of vibration isolator type with location and load on each.
  - 2. Fully dimensioned fabrication drawings and installation details for vibration isolation bases, member sizes, attachments to isolators, and supported equipment.

3. Include auxiliary motor slide bases and rails, base weights, inertia bases, concrete weights, equipment static loads, support points, vibration isolators, and detailed layout of isolator location and orientation with static and dynamic load on each isolator.
  4. Include selections from prescriptive design tables that indicate compliance with the applicable building code and the vibration isolator manufacturer's requirements.
  5. Clearly indicate the load and capacity assumptions selected. Include copies of any calculations.
  6. Include the calculations that indicate compliance with the applicable building code for seismic controls and the vibration isolator manufacturer's requirements.
  7. Include the seal of the Professional Structural Engineer registered in the State of Washington in which the Project is located, on drawings and calculations which at a minimum include the following:
    - a. Seismic Restraint Details: Detailed drawings of seismic restraints and snubbers including anchorage details that indicate quantity, diameter, and depth of penetration, edge distance, and spacing of anchors.
    - b. Equipment Seismic Qualification Certification: Certification by the manufacturer or responsible party that each piece of equipment provided will withstand seismic force levels as specified in the applicable building code for seismic controls.
      - 1) Basis for Certification: Indicate whether the withstand certification is based on actual testing of assembled components, on calculations, or on historic data.
      - 2) Indicate equipment to be sufficiently durable to resist design forces and or remain functional after the seismic event.
    - c. Dimensioned outline drawings of equipment identifying center of gravity, locations, and provisions for mounting and anchorage.
    - d. Detailed description of the equipment anchorage devices on which the certifications are based.
- D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

#### **1.05 QUALITY ASSURANCE**

- A. Comply with applicable building code.
- B. Perform design and installation in accordance with applicable codes.
- C. Designer Qualifications: Perform design under direct supervision of a Professional Structural Engineer experienced in design of this type of work and registered and licensed in Washington.
- D. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
  1. Member of Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).

- E. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of documented experience.
- F. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Kinetics Noise Control, Inc.: [www.kineticsnoise.com](http://www.kineticsnoise.com).
- B. Mason Industries: [www.mason-ind.com](http://www.mason-ind.com).
- C. M.W. Saussé & Co., Inc.; [www.vibrex.net](http://www.vibrex.net).
- D. Amber/Booth Company: [www.amberbooth.com](http://www.amberbooth.com).
- E. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. General:
  - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
  - 2. Steel springs to function without undue stress or overloading.
  - 3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
  - 4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.
  - 5. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.
- B. Provide vibration isolation on motor driven equipment over 2.0 hp, plus connected piping and ductwork.
- C. Provide minimum static deflection of isolators for equipment as follows:
  - 1. Upper Floors, Normal
    - a. 400 - 600 rpm: 3.5 inch
    - b. 600 - 800 rpm: 2 inch
    - c. 800 - 900 rpm: 1 inch
    - d. 1100 - 1500 rpm: 0.5 inch
    - e. Over 1500 rpm: 0.2 inch
  - 2. Upper Floors, Critical
    - a. 600 - 800 rpm: 3.5 inch
    - b. 800 - 900 rpm: 2 inch
    - c. 1100 - 1500 rpm: 1 inch
    - d. Over 1500 rpm: 0.5 inch

- D. Consider upper floor locations critical unless otherwise indicated.
- E. Use concrete inertia bases for fans having static pressure in excess of 3.0 inches water column or motors in excess of 20 hp, and on base mounted pumps over 10 hp.
- F. Maintain sound level of spaces at levels not to exceed those listed below by utilizing acoustical devices.
- G. Maintain rooms at following maximum sound levels, in Noise Criteria (NC) as defined by ASHRAE Handbook, HVAC Applications.
  - 1. Offices:
    - a. Executive: 25
    - b. Conference rooms: 25
    - c. Private: 30
    - d. Open-plan areas: 35
    - e. Computer/business machine areas: 40
    - f. Public circulation: 40

### **2.03 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES**

- A. Structural Bases:
  - 1. Construction: Engineered, structural steel frames with welded brackets for side mounting of the isolators.
  - 2. Frames: Square, rectangular or T-shaped.
  - 3. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.
  - 4. Applications: Adjustable motor slide rails for centrifugal fans.
- B. Concrete Inertia Bases:
  - 1. Construction: Engineered, steel forms, with integrated isolator brackets and anchor bolts, welded or tied reinforcing bars running both ways in a single layer.
  - 2. Size: 6 inches minimum depth and sized to accommodate elbow supports.
  - 3. Mass: Minimum of 1.5 times weight of isolated equipment.
  - 4. Connecting Point: Reinforced to connect isolators and snubbers to base including template and fastening devices for equipment.
  - 5. Concrete: Filled on site with minimum 3000 psi concrete.
  - 6. Applications: Adjustable motor slide rails for centrifugal fans.

### **2.04 VIBRATION ISOLATORS**

- A. General Requirements:
  - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
- B. Non-Seismic Type:
  - 1. All Elastomeric-Fiber Glass Pads:



- a. Configuration: Flat or molded.
  - b. Thickness: 0.25 inch minimum.
  - c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.
2. Elastomeric Mounts:
    - a. Material: Oil, ozone, and oxidant resistant compounds.
    - b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
  3. Steel Springs:
    - a. Assembly: Freestanding, laterally stable without housing.
    - b. Leveling Device: Rigidly connected to equipment or frame.
  4. Restrained Steel Springs:
    - a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
    - b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.
  5. Elastomeric Hangers:
    - a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
    - b. Furnish steel load distribution plate sandwiching elastomeric element to housing.
  6. Spring Hanger:
    - a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
    - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
  7. Combination Elastomeric-Spring Hanger:
    - a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
    - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
  8. Thrust Restraints:
    - a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
    - b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.
- C. Seismic Type:
1. Coil Springs Consisting of Multiple Elements:
    - a. Housing: Manufactured from cast iron, cast aluminum, or steel material.
    - b. Ductile Material: Designed and rated for seismic applications.

- c. Spring: Restrained by housing without significant degradation of vibration isolation capabilities during normal equipment operating conditions.
  - d. Resilient Snubbing Grommet System: Incorporated and designed with clearances of no more than 0.25 inch in any direction preventing direct metal-to-metal contact between supported member and fixed restraint housing.
  - e. Resilient Pad: Located in series with spring.
  - f. Coil Springs: Color coded elements to have a lateral stiffness greater than 0.8 times the rated vertical stiffness with 50 percent overload capacity.
  - g. Finish: Suitable for the application.
2. All Directional Elastomeric:
- a. Material: Molded from oil, ozone, and oxidant resistant compounds.
  - b. Operating Parameters: Designed to operate within the isolator strain limits providing maximum performance and service life.
  - c. Attachment Method: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
  - d. Rating: Cast iron and aluminum housings rated for seismic restraint applications.
  - e. Minimum Operating Static Deflections: Deflections indicated in project documents are not to exceed published load capacities.

## **2.05 SEISMIC RESTRAINT SYSTEMS**

- A. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.
- B. Cable Restraints:
  1. Comply with ASCE 19.
  2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
  3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
  4. Use protective thimbles for cable loops where potential for cable damage exists.
- C. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.
- D. Comply with:
  1. ASHRAE Handbook - HVAC Applications
  2. FEMA 412
  3. FEMA 413
  4. FEMA 414
  5. FEMA E-74
  6. SMACNA - Seismic Duct Restraint Manual
- E. Cable Restraints:

1. Wire Rope: Steel wire strand cables sized to resist seismic loads in all lateral directions.
  2. Protective Thimbles: Eliminates potential for dynamic cable wear and strand breakage.
  3. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
  4. Connections:
    - a. Use overlapping wire rope U clips, cable clamping bolts, swaged sleeves or seismically rated tool-less wedge insert lock connectors.
    - b. Internally brace clevis hanger bracket cross bolt to prevent deformation.
  5. Vertical Suspension Rods: Attach required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.
- F. Rigid Restraints:
1. Structural Element: Sized to resist seismic loads in all lateral directions and carry both compressive and tensile loading.
  2. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
  3. Connections: Internally brace clevis hanger bracket cross bolt to prevent deformation.
  4. Static Support System: Anchorage capable of carrying additional tension loads generated by the vertical component of the rigid brace compression which is additive to any static load requirements on the system.
  5. Vertical Suspension Rods: Attached required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

## **2.06 DUCTWORK LAGGING**

- A. Acoustic Insulation: 2 inch thick, 3 to 5 lb/cu ft density glass fiber or mineral wool insulation.
- B. Covering: Gypsum board with surface weight minimum 4 lb/sq ft.

## **PART 3 EXECUTION**

### **3.01 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.

### **3.02 INSTALLATION - GENERAL**

- A. Install in accordance with manufacturer's instructions.
- B. Support duct silencers independent of ductwork. Refer to Section 23 31 00.
- C. Install cross-talk silencers in wall. Caulk wall penetrations; refer to Section 07 92 00.

- D. Lag ductwork, where indicated by wrapping with insulation and covering. Apply covering to be airtight. Do not attach covering rigidly to ductwork.
- E. Attach ductwork to acoustic louvers with flexible duct connections. Refer to Section 23 33 00.
- F. Bases:
  - 1. Set steel bases for one inch clearance between housekeeping pad and base.
  - 2. Set concrete inertia bases for 2 inches clearance between housekeeping pad and base.
  - 3. Adjust equipment level.
- G. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- H. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- I. Provide pairs of horizontal limit springs on fans with more than 6.0 inches WC static pressure, and on hanger supported, horizontally mounted axial fans.
- J. Support piping connections to equipment mounted on isolators using isolators or resilient hangers as follows:
  - 1. Up to 4 Inches Pipe Size: First three points of support.
  - 2. 5 to 8 Inches Pipe Size: First four points of support.
  - 3. 10 inches Pipe Size and Over: First six points of support.
  - 4. Select three hangers closest to vibration source for minimum 1.0 inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0 inch static deflection or 1/2 static deflection of isolated equipment.

### **3.03 INSTALLATION - SEISMIC**

- A. Refer to Section 23 05 49.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect vibration isolation and/or seismic control components for damage and defects.
- C. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.
- D. Inspect isolated equipment after installation and submit report. Include static deflections.

### **3.05 EXPOSED DUCTWORK**

- A. Use 2-1/2 inch thick, 3.0 # density fiberglass tank/pipe type insulation, with integral Kraft paper jacket.
- B. In interior, exposed applications, follow with additional layer of Kraft foil face vapor retarder with all joints sealed with vapor sealing tape and then followed with an 8 oz/sq yd canvas cloth glued with two coats of sizing.

**3.06 SCHEDULE**

A. Pipe Isolation Schedule.

1. 1 Inch Pipe Size: Isolate 120 diameters from equipment.
2. 2 Inch Pipe Size: Isolate 90 diameters from equipment.
3. 3 Inch Pipe Size: Isolate 80 diameters from equipment.
4. 4 Inch Pipe Size: Isolate 75 diameters from equipment.

**END OF SECTION**

**SECTION 23 05 49**  
**HVAC SEISMIC RESTRAINT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Seismic restraint of equipment, piping and ductwork.

**1.02 RELATED SECTIONS**

- A. Section 23 00 00 - BASIC HVAC REQUIREMENTS.
- B. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- C. Section 23 31 00 - HVAC Ducts and Casings.
- D. Section 23 72 23 - Packaged Air-to-Air Energy Recovery Units.
- E. Section 23 81 27 - Split-System Heating and Cooling.

**1.03 QUALITY ASSURANCE**

- A. Seismic Restraints:
  - 1. The Anchorage and/or seismic restraint of permanent equipment and associated systems listed below shall be designed to resist the total design seismic forces prescribed in the latest edition of the International Building Code.
    - a. All floor or roof-mounted equipment weighing 400 lbs. or greater.
    - b. All suspended or wall-mounted equipment weighing 20 lbs. or greater.
    - c. All vibration-isolated equipment weighing 20 lbs. or greater.
    - d. All piping 1 1/4 inches nominal diameter and larger located in boiler, mechanical equipment and refrigeration mechanical rooms.
    - e. All piping 2 1/2" inches nominal diameter and larger.
    - f. All ductwork 6 square feet and larger in cross sectional area.
    - g. All round ductwork 28 inches in diameter and larger.
    - h. Pipes, electrical conduit and ducts supported by a trapeze where none of those elements would individually require bracing, require bracing when the combined operating weight of all elements supported by the trapeze is 10 lbs/ft or greater.
- B. All calculations shall be in accordance with Chapter 16 of the latest edition of the International Building Code.

**1.04 SUBMITTALS**

- A. Submit the following in accordance with Section 01 30 00:
  - 1. All anchorage and seismic restraints shall be designed and stamped by a professional engineer licensed in the state of the project location. Design shall include:
    - a. Number, size and location of anchors for floor or roof-mounted equipment. For curb-mounted equipment, provide design of attachment of both the unit to the curb and the

- curb to the structure. In addition, provide calculations or test data verifying the curb can accept the seismic loads.
- b. Number, size and location of seismic restraint devices and anchors for vibration-isolated and suspended equipment. Provide calculations or test data verifying the horizontal and vertical ratings of the seismic restraint devices.
  - c. Number, size and location of braces and anchors for suspended piping and ductwork on shop drawings. In addition:
    - 1) The contractor must select a single seismic restraint system pre-designed to meet the requirements of the latest edition of the International Building Code such as the 2011 Mason Industries Seismic Restraint Guidelines for Suspended Piping, Ductwork, Electrical Systems and floor and roof mounted equipment.
    - 2) Details or designs from separate seismic restraint guidelines are not acceptable. Installations not addressed by the selected system must be designed, detailed and submitted along with the shop drawings.
    - 3) Maximum seismic loads shall be indicated on drawings at each brace location. Drawings shall bear the stamp and signature of the registered professional engineer licensed in the state of the project location who designed the layout of the braces.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Amber Booth.
- B. Mason Industries, Inc.
- C. Kinetics Corporation.
- D. Vibrex.
- E. Substitutions: Under provisions of Section 01 60 00.

### **2.02 SEISMIC RESTRAINTS**

- A. General Requirements:
  1. Seismic restraints shall be provided for all equipment, both supported and suspended, piping and ductwork as listed above.
  2. Bracing of piping and ductwork shall be in accordance with provisions set forth in SMACNA seismic restraint manual.
  3. Structural requirements for restraints, including their attachment to building structure, shall be reviewed and approved by the structural engineer.
  4. Attachments to supported or suspended equipment must be coordinated with the equipment manufacturer.
- B. Supported Equipment Products:

1. Seismic restraints shall consist of interlocking steel members restrained by shock absorbent neoprene materials compounded to bridge bearing specifications as previously noted in paragraph 1.3. Elastomeric materials shall be replaceable and be a minimum 3/4-inch thick. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8-inch, nor more than 1/4-inch. Type 1 - Seismic Snubbers: All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4 inch thick. A minimum air gap of 1/8 inch shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. The snubber shall be designed to accept horizontal and vertical seismic loads as defined in Section 1.03.B. Mason Type Z-1225 or Z-1011.
  2. Each snubber shall be capable of restraint in all three mutually orthogonal directions. Type 2 - Seismic Sway Braces - Seismic sway braces shall consist of galvanized steel aircraft cables or steel angles/channels. Cables braces shall be designed to resist seismic tension loads and steel braces shall be designed to resist both tension and compression loads with a minimum safety factor of 2. Brace end connections shall be steel assemblies that swivel to the final installation angle. Do not mix cable and steel braces to brace the same system or equipment. Steel angles, when required, shall be clamped to the threaded hanger rods at the seismic sway brace locations utilizing a minimum of two ductile iron clamps. Sway braces shall be designed to accept horizontal and vertical seismic loads as defined in Section 1.03.B. Mason Type SCB, SSB, SRC and UC.
  3. Submittals shall include load versus deflection curves up to 1/2-inch on the x, y and z planes.
  4. Mason Model Z-1011
- C. Bracing of Pipes:
1. Provide seismic bracing of all piping as detailed below. (Exception: Piping suspended by individual hangers 12 inches or less in length, as measured from the top of the pipe to the bottom of the support where the hanger is attached, need not be braced).
    - a. Brace all gas piping.
    - b. Brace all piping located in boiler rooms, mechanical equipment rooms, and refrigeration mechanical rooms that is 1-1/4-inch nominal diameter and larger.
    - c. Brace all pipes 2-1/2-inch nominal diameter and larger.
  2. For all gas piping, as specified in 1(a) the bracing details, schedules, and notes may be used, except that transverse bracing shall be at 20 feet maximum, and longitudinal bracing shall be at 40 feet maximum.
  3. Seismic braces for pipes on trapeze hangers may be used.



4. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints or where rigidly supported pipes connect to equipment with vibration isolators. For threaded piping, the flexibility may be provided by the installation of swing joints.
  5. Cast iron pipe of all types, glass pipe, and any other pipe jointed with a shield and clamp assembly, where the top of the pipe is 12 inches or more from the supporting structure, shall be braced on each side of a change in direction of 90 degrees or more. Riser joints shall be braced or stabilized between floors.
  6. Vertical risers shall be laterally supported with a riser clamp at each floor. For buildings greater than six stories high, all risers shall be engineered individually.
- D. Bracing of Ductwork:
1. Brace rectangular ducts with cross sectional areas of 6 square feet and larger. Brace flat oval ducts in the same manner as rectangular ducts. Brace round ducts with diameters of 28 inches and larger. Brace flat oval ducts the same as rectangular ducts of the same nominal size (Exception: No bracing is required if the duct is suspended by hangers 12 inches or less in length, as measured from the top of the duct to the bottom of the support where the hanger is attached).
  2. Transverse bracing shall occur at the interval specified in the SMACNA tables or at both ends if the duct run is less than the specified interval. Transverse bracing shall be installed at each duct turn and at each end of a duct run, with a minimum of one brace at each end.
  3. Longitudinal bracing shall occur at the interval specified in the SMACNA tables with at least one brace per duct run. Transverse bracing for one duct section may also act as longitudinal bracing for a duct section connected perpendicular to it if the bracing is installed within four feet of the intersection of the ducts and if the bracing is sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.
- E. Suspended Equipment and Piping and Ductwork:
1. Cable Method: The seismic restraint shall consist of a combination of stranded steel aircraft cable and the specified vibration isolation hanger with an added nut and neoprene and steel washer. The cable resists lateral and downward motion. The modified vibration hanger resists upward motion.
  2. Cable attachment details, cable size, and the neoprene and steel washers shall be sized by the manufacturer and are to be indicated in the Shop Drawings.
  3. Provide detailed Shop Drawings for approval in sufficient time to allow structural attachment work to be incorporated into the normal work sequence.

## **PART 3 EXECUTION**

### **3.01 SEISMIC RESTRAINTS**

- A. General:

1. Install and adjust seismic restraints so that the equipment, piping, and ductwork supports are not degraded by the restraints.
  2. Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.
- B. Supported Equipment:
1. Each vibration isolation frame for supported equipment shall have a minimum of four seismic snubbers mounted as close as possible to the vibration isolators and/or the frame extremities.
  2. Care must be taken so that a minimum 1/8-inch air gap in the seismic restraint snubber is preserved on all sides in order that the vibration isolation potential of the isolator is not compromised. This requires that the final snubber adjustment be completed after the vibration isolators are properly installed and the installation approved.
- C. Bracing of Pipes:
1. Branch lines may not be used to brace main lines.
  2. Transverse bracing shall be at 40 feet maximum except where a lesser spacing is indicated in the SMACNA tables for bracing of pipes.
  3. Longitudinal bracing shall be at 80 feet maximum except where a lesser spacing is indicated in the tables. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided that it has a capacity equal to or greater than a longitudinal brace. The longitudinal braces and connections must be capable of resisting the additional force induced by expansion and contraction.
  4. A rigid piping system shall not be braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.
  5. Transverse bracing for one pipe section may also act as longitudinal bracing for a pipe section of the same size connected perpendicular to it if the bracing is installed within 24 inches of the elbow or tee.
- D. Bracing of Ductwork:
1. Hangers must be positively attached to the duct within 2 inches of the top of the duct with a minimum of two #10 sheet metal screws.
  2. Group of ducts may be combined in larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.
  3. Walls, including gypsum board nonbearing partitions, which have ducts running through them, may replace a typical transverse brace. Provide solid blocking around duct penetrations at stud wall construction.
  4. Unbraced ducts shall be installed with a 6-inch minimum clearance to vertical ceiling hanger wires.

- E. Suspended Equipment, Piping, and Ductwork Cable Method:
1. Cables shall be adjusted to a degree of slackness approved by the Structural Engineer.
  2. Uplift and downward restraint nuts and washers for the Type HST hangers shall be adjusted so that there is a minimum 1/4-inch clearance.

**END OF SECTION**

**SECTION 23 05 53**  
**IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Labels.
- E. Lockout devices.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 91 23 - Interior Painting: Identification painting.

**1.03 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - 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.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
- B. Safety Sign Company: [www.safetysignco.com](http://www.safetysignco.com).
- C. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: Black.
  - 2. Letter Height: 1/2 inch.
  - 3. Background Color: Yellow.
  - 4. Plastic: Comply with ASTM D709.

### **2.03 TAGS**

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

### **2.04 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 thick, manufactured for direct burial service.

### **2.05 LABELS**

- A. Description: Aluminum, size 1.9 x 0.75 inches, adhesive backed with printed identification.

### **2.06 LOCKOUT DEVICES**

- A. Lockout Hasps:
  - 1. Manufacturers:
    - a. Anodized aluminum or Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.
- B. Valve Lockout Devices:
  - 1. Steel device preventing access to valve operator, accepting lock shackle.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 23 for stencil painting.

### **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. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with 8 x 4 inch plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Tag automatic controls, instruments, and relays. Key to control schematic.
- I. Identify piping, concealed or exposed, with plastic pipe markers, plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. 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.
- J. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION**

**SECTION 23 05 93**  
**TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.
- C. Commissioning activities.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 21 00 - Allowances: Inspection and testing allowances.
- B. Section 01 40 00 - Quality Requirements: Employment of testing agency and payment for services.
- C. Section 01 91 13 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.
- D. Section 23 08 00 - Commissioning of HVAC.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. Cash Allowance: See Section 01 21 00 for additional requirements.
- B. Allowance includes testing, adjusting, and balancing of mechanical systems.

**1.04 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 2008, with Errata (2019).

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. 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 to Architect.
  - 2. Submit to the Commissioning Authority and Construction Manager.
  - 3. Submit six weeks prior to starting the testing, adjusting, and balancing work.
  - 4. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
  - 5. Include at least the following in the plan:
    - a. Preface: An explanation of the intended use of the control system.

- b. 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.
- c. 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.
- d. Identification and types of measurement instruments to be used and their most recent calibration date.
- e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
- f. Final test report forms to be used.
- g. Detailed step-by-step procedures for TAB work for each system and issue, including:
  - 1) Terminal flow calibration (for each terminal type).
  - 2) Diffuser proportioning.
  - 3) Branch/submain proportioning.
  - 4) Total flow calculations.
  - 5) Rechecking.
  - 6) Diversity issues.
- h. Expected problems and solutions, etc.
- i. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
- j. Details of how TOTAL flow will be determined; for example:
  - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
  - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
- k. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
- l. Confirmation of understanding of the outside air ventilation criteria under all conditions.
- m. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
- n. Method of checking building static and exhaust fan and/or relief damper capacity.
- o. Proposed selection points for sound measurements and sound measurement methods.
- p. Methods for making coil or other system plant capacity measurements, if specified.
- q. Time schedule for TAB work to be done in phases (by floor, etc.).
- r. Description of TAB work for areas to be built out later, if any.
- s. Time schedule for deferred or seasonal TAB work, if specified.



- t. False loading of systems to complete TAB work, if specified.
  - u. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
  - v. Interstitial cavity differential pressure measurements and calculations, if specified.
  - w. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
  - x. Procedures for formal progress reports, including scope and frequency.
  - y. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Field Logs: Submit at least twice a week to the Commissioning Authority.
- E. 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.
- F. Progress Reports.
- G. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit to the the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
  - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
  - 3. 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.
  - 4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
  - 5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  - 6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  - 7. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
  - 8. 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.
  - i. Project altitude.
  - j. Report date.
- H. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

## **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.
- 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.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. TAB Supervisor Qualifications: Professional Engineer licensed in the State in which the Project is located.
- G. Pre-Qualified TAB Agencies:
  - 1. Northwest Engineering Service, Inc.
  - 2. Air Balancing Specialty.
  - 3. Neudorfer Engineers.
  - 4. Precisionaire Northwest.
  - 5. Accurate Balancing Agency, Inc.
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

### **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.
  12. Hydronic systems are flushed, filled, and vented.
  13. Pumps are rotating correctly.
  14. Proper strainer baskets are clean and in place.
  15. Service and balance valves are open.
- 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 PREPARATION**

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

### **3.04 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.

### **3.05 RECORDING AND ADJUSTING**

- A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
  2. Discrepancies, deficient or uncompleted work by others.
  3. Contract interpretation requests.
  4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.

- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.

### **3.06 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. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. 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.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

- M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.
- N. 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.
- O. On fan powered VAV boxes, adjust air flow switches for proper operation.

### **3.07 COMMISSIONING**

- A. See Sections 01 91 13 - General Commissioning Requirements and 23 08 00 for additional requirements.
- B. Perform prerequisites prior to starting commissioning activities.
- C. Fill out Prefunctional Checklists for:
  - 1. Air side systems.
  - 2. Water side systems.
- D. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.
- E. Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for 25 percent of the air handlers plus a random sample equivalent to 5 percent of the final TAB report data as directed by Commissioning Authority.
  - 1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
  - 2. Use the same test instruments as used in the original TAB work.
  - 3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
  - 4. For purposes of re-check, failure is defined as follows:
    - a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
    - b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
    - c. Temperatures: Deviation of more than one degree F.
    - d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
    - e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
  - 5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system

served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.

- F. In the presence of the Commissioning Authority, verify that:
  - 1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
  - 2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
  - 3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.
- G. No seasonal tests are required.
- H. No further monitoring is required.
- I. No deferred testing is required.

### **3.08 SCOPE**

- A. Test, adjust, and balance the following:
  - 1. Fans.
  - 2. Air Inlets and Outlets.
  - 3. Packaged Air-to-Air Energy Recovery Units.
  - 4. Split-System Heating and Cooling Heat Pump System.
  - 5. Radiant Heating and Cooling Unit.
  - 6. Air Coils.

### **3.09 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.

8. Sheave Make/Size/Bore.

B. V-Belt Drives:

1. Identification/location.
2. Required driven RPM.
3. Driven sheave, diameter and RPM.
4. Belt, size and quantity.
5. Motor sheave diameter and RPM.
6. Center to center distance, maximum, minimum, and actual.

C. Pumps:

1. Identification/number.
2. Manufacturer.
3. Size/model.
4. Impeller.
5. Service.
6. Design flow rate, pressure drop, BHP.
7. Actual flow rate, pressure drop, BHP.
8. Discharge pressure.
9. Suction pressure.
10. Total operating head pressure.
11. Shut off, discharge and suction pressures.
12. Shut off, total head pressure.

D. Electric Duct Heaters:

1. Manufacturer.
2. Identification/number.
3. Location.
4. Model number.
5. Design kW.
6. Number of stages.
7. Phase, voltage, amperage.
8. Test voltage (each phase).
9. Test amperage (each phase).
10. Air flow, specified and actual.
11. Temperature rise, specified and actual.

E. Air Moving Equipment:

1. Location.
2. Manufacturer.
3. Model number.

4. Serial number.
  5. Arrangement/Class/Discharge.
  6. Air flow, specified and actual.
  7. Return air flow, specified and actual.
  8. Outside air flow, specified and actual.
  9. Total static pressure (total external), specified and actual.
  10. Inlet pressure.
  11. Discharge pressure.
  12. Sheave Make/Size/Bore.
  13. Number of Belts/Make/Size.
  14. Fan RPM.
- F. Return Air/Outside Air:
1. Identification/location.
  2. Design air flow.
  3. Actual air flow.
  4. Design return air flow.
  5. Actual return air flow.
  6. Design outside air flow.
  7. Actual outside air flow.
  8. Return air temperature.
  9. Outside air temperature.
  10. Required mixed air temperature.
  11. Actual mixed air temperature.
  12. Design outside/return air ratio.
  13. Actual outside/return air ratio.
- 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. Inlet pressure.
  8. Discharge pressure.
  9. Sheave Make/Size/Bore.
  10. Number of Belts/Make/Size.
  11. 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.

**END OF SECTION**

**SECTION 23 07 13**  
**DUCT INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Duct insulation.
- B. Insulation jackets.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 09 91 23 - Interior Painting: Painting insulation jackets.
- C. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- D. Section 23 05 53 - Identification for HVAC Piping and Equipment.
- E. Section 23 31 00 - HVAC Ducts and Casings: Glass mineral wool ducts.

**1.03 REFERENCE STANDARDS**

- A. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2021.
- 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 C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- F. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- G. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- H. ASTM C1338 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2019.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2022.
- K. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- L. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- M. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE).
- N. North American Insulation Manufacturers Association (NAIMA).

- O. National Fire Protection Association (NFPA).
- P. Underwriter's Laboratories (UL Environment).
- Q. Underwriter's Laboratories Environmental (UL Environment).

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section.
- C. Surface-Burning Characteristics: For insulation and related materials, UL/ULC Classified per UL 723 or meeting ASTM E84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
- D. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
- E. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- F. Formaldehyde Free: Third party certified with UL Environment Validation.
- G. Biosoluble: As determined by research conducted by the International Agency for Research on Cancer (IARC) and supported by revised reports from the National Toxicology Program (NTP) and the California Office of Environmental Health Hazard Assessment. Certified by European Certification Board for Mineral Wool Products (EUCEB).
- H. Recycled Content: A minimum of 50 percent recycled glass content.
- I. Low Emitting Materials: For all thermal and acoustical applications of Glass Mineral Wool Insulation Products, provide materials complying with the testing and products requirements of UL GREENGUARD Gold Certification.
- J. Living Building Challenge-Declare Red List Free.

#### **1.06 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.

#### **1.07 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.

#### **1.08 DEFINITIONS**

- A. Thermal Conductivity (K value): Units of Btu-inch/hour per square foot per degree F.
- B. UL GREENGUARD: Provides independent third-party, Indoor Air Quality (IAQ) certification of products for emissions of respirable particles and Volatile Organic Compounds (VOC's), including formaldehyde and other specific product-related pollutants. Certification is based upon criteria used by EPA, OSHA, and WHO.
- C. ASJ+: All Service Jacket composed of aluminum foil reinforced with glass scrim bonded to a kraft paper interleaving with an outer film layer leaving no paper exposed.
- D. ASJ: All Service Jacket (no outer film).
- E. SSL+: Self-Sealing Lap with Advanced Closure System.
- F. SSL: Self-Sealing Lap.
- G. FSK: Foil Scrim Kraft; jacketing.
- H. PSK: Poly Scrim Kraft; jacketing.
- I. PVC: PolyVinyl Chloride.
- J. Glass Mineral Wool: Interchangeable with fiber glass, but replacing the term in the attempt to disassociate and differentiate Glass Mineral Wool from the potential health and safety of special purpose or reinforcement products that do not meet the bio solubility criteria of insulation made from glass. Rock Mineral Wool will replace the traditional Mineral Wool label. Both are used in lieu of the Mineral Mineral Wool label.
- K. ECOSE Technology: a revolutionary new binder system based on rapidly renewable bio-based materials; rather than petroleum-based chemicals commonly used in other glass mineral wool insulation materials. ECOSE Technology reduces the binder embodied energy by up to 70 percent and does not contain phenol, formaldehyde, acrylics or artificial colors.
- L. UL GREENGUARD Gold Certification: (formerly known as GREENGUARD Children & Schools Certification) offers stricter certification criteria, considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities. It is referenced by both The Collaborative for High Performance Schools (CHPS) and the Leadership in Energy Environmental Design (LEED) Building Rating Systems.
- M. Declare and The Living Building Challenge - The Living Building Challenge is a philosophy, advocacy tool and certification program that addresses development at all scales. The purpose

of The Living Building Challenge is to define the most advanced measure of sustainability in the built environment today and acts to diminish the gap between current limits and ideal solutions. Declare supports The Living Building Challenge by providing a transparent materials database that project teams can select from to meet Imperative 11.

- N. Imperative 11, Red List - requires that manufacturers disclose the ingredients in their products to insure that they are free of Red List chemicals and materials. The Red List represents the "worst in class" materials, chemicals and elements known to pose serious risks to human health and the greater ecosystem.
- O. UL Environment Claims Validation (ECV): service and label tests a manufacturer's product and validates that the environmental claims they make in their marketing and packaging materials are factual. This Environmental Claims Validation (ECV) service will allow manufacturers to verify that their products contain a quantifiable amount of recycled content and, as such, help limit raw material extraction and reduce landfill waste. It also will enable products to qualify for LEED® points under Pilot Credit 43: MR - Certified Products.
- P. Recycled content - materials such as bottled glass collected at curbside or other collection sites after consumer use and/or materials used or created from one manufacturing process which are collected as scrap and placed back into another manufacturing process rather than being placed in a landfill or incinerated.
- Q. Polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE or Deca-BDE fire retardants: have been linked to adverse health effects after exposure in low concentrations.
- R. UL Classified: UL has tested and evaluated samples of the product with respect to certain properties of the product. UL Classifies products to:
  - 1. Applicable UL requirements.
  - 2. Standards for safety.
  - 3. Standards of other National and International organizations.

## **PART 2 PRODUCTS**

### **2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION**

- 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 DUCT WRAP, FLEXIBLE**

- A. Manufacturer:
  - 1. Knauf Insulation; Atmosphere Duct Wrap with Ecosse Technology: [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville; "Microlite FSK": [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corporation; "SOFTTR" or "EcoTouch": [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  - 4. CertainTeed Corporation; "Soft Touch": [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Insulation: ASTM C553; flexible, noncombustible blanket.
  - 1. 'K' value: 0.29 at 75 degrees F, when tested in accordance with ASTM C177.
  - 2. Maximum Service Temperature: 250 degrees F.
  - 3. Maximum Water Vapor Sorption: <5.0 percent by weight per ASTM C1104/C1104M.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film (FSK).
  - 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. Outdoor Vapor Barrier Mastic:
  - 1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- F. Tie Wire: Annealed steel, 16 gage.

### **2.03 GLASS FIBER, RIGID**

- A. Manufacturer:
  - 1. Knauf Insulation; Model "Rigid Plenum Liner": [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville Corporation; Permacote Linacoustic R-300": [www.jm.com](http://www.jm.com).
  - 3. CertainTeed Corporation; Model "ToughGard® Rigid Liner Board": [www.certainteed.com](http://www.certainteed.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
  - 1. ASTM C1071, Type II.
  - 2. 'K' value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
  - 3. Maximum service temperature: 450 degrees F.
  - 4. Maximum Water Vapor Sorption: 5.0 percent.
  - 5. Maximum Density: 8.0 lb/cu ft.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/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 Finish:
  - 1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
  - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.
- F. UL/ULC Classified per UL 723. Comply with ASTM C1071 Type I and Type II, NFPA 90A, and NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard." UL GREENGUARD Certified does not support the growth of mold, fungi, or bacteria per ASTM C1338 and meets UL Environment GREENGUARD Microbial Resistance Listing per UL 2824 - "GREENGUARD Certification Program Method for Measuring Microbial Resistance ". UL/E validated to be formaldehyde free. DecaBDP Free.

#### **2.04 DUCT LINER**

- A. Manufacturers:
  - 1. Knauf Insulation: [www.knaufinsulation.com](http://www.knaufinsulation.com).
  - 2. Johns Manville: [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
  - 4. CertainTeed Corporation; Model "ToughGard® Duct Liner": [www.certainteed.com](http://www.certainteed.com).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation: Non-corrosive, incombustible glass mineral wool complying with ASTM C1071; mat faced air stream surface and edges coated with acrylic polymer.
  - 1. Fungi Resistance: ASTM G21.
  - 2. UL GREENGUARD Certified does not support the growth of mold, fungi, or bacteria per ASTM C1338.
  - 3. Meets UL Environment GREENGUARD Microbial Resistance Listing per UL 2824 - "GREENGUARD Certification Program Method for Measuring Microbial Resistance" DecaBDP Free.
  - 4. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
  - 5. Service Temperature: Up to 250 degrees F.
  - 6. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
  - 7. Minimum Noise Reduction Coefficients:
    - 8. 1/2 inch Thickness: 0.45.
    - 9. 1 inch Thickness: 0.70.
    - 10. 1-1/2 inches Thickness: 0.80.
    - 11. 2 inch Thickness: 0.85.
- C. Liner Fasteners: Galvanized steel.

#### **2.05 JACKETS**

- 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. Glass Mineral Wool (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square.
- C. Aluminum Jacket: ASTM B209/B209M.
  1. Thickness: 0.020 inch sheet.
  2. Finish: Embossed.
  3. Joining: Longitudinal slip joints and 2 inch laps.
  4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
  6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. 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 integral 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. Insulated Ducts Conveying Air Above Ambient Temperature:
  1. Provide with or without standard vapor barrier jacket.
  2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- F. Exterior Applications: Provide board insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.
- G. External Duct Insulation Blanket or Board Application:
  1. Secure insulation with vapor barrier with mechanical fasteners and seal jacket joints with vapor barrier tape to match jacket.
  2. Secure board insulation without vapor barrier with mechanical fasteners (pins and speed washers).



3. Install without sag on underside of duct. Use mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
  4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive or FSK tape made for duct wrap or FSK board.
  5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- H. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 100 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 air-flow. Increase duct size to allow for insulation thickness.
  6. Refer to SMACNA publication for transverse edges for velocities over 2500 fpm.

### **3.03 SCHEDULES**

- A. Exhaust Ducts Within 10 ft of Exterior Openings:
1. Flexible Glass Mineral Wool Duct Insulation: Minimum 2 inches thick or R-Value of 8.
- B. Outside Air Intake Ducts:
1. Flexible Glass Mineral Wool Duct Insulation: Minimum 2 inches thick or R-Value of 8.
- C. Supply Ducts:
1. Flexible Glass Mineral Wool Duct Insulation: Minimum 1.5 inches thick or R-Value of 5.
- D. Exhaust Ducts Downstream of ERV:
1. Flexible Glass Mineral Wool Duct Insulation: Minimum 2 inches thick or R-Value of 8.

**END OF SECTION**

**SECTION 23 31 00**  
**HVAC DUCTS AND CASINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal ductwork.
- B. Casing and plenums.
- C. Duct cleaning.
- D. Duct systems have been designed for metal duct.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 07 84 00 - Firestopping.
- C. Section 09 91 23 - Interior Painting: Weld priming, weather resistant, paint or coating.
- D. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- E. Section 23 05 49 - HVAC SEISMIC RESTRAINT.
- F. Section 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC.
- G. Section 23 07 13 - Duct Insulation: External insulation and duct liner.
- H. Section 23 33 00 - Air Duct Accessories.
- I. Section 23 37 00 - Air Outlets and Inlets.

**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; 2020.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021.
- E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.
- G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2021.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

- I. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
- J. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.
- K. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
- L. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.
- M. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.
- N. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.
- O. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

#### **1.04 COORDINATION**

- A. The Drawings do not attempt to show exact details of all ductwork. No extra payment will be allowed for obstruction by work of other trades or local obstructions to the work which require offsets. Where diagrams have been made to show duct connections, the Contractor is cautioned that these diagrams must not be used for obtaining material quantities.
- B. Changes in location of equipment or ductwork, advisable in the opinion of the Contractor, shall be submitted to the Engineer for review before proceeding with the work. All measurements and dimensions shall be verified at the site.
- C. Duct sizes shown on the Drawings represent the nominal free area required for that service. Where changes in duct dimensions are necessary to coordinate the installation, the contractor is allowed, with prior permission from the project engineer, to use alternative equivalent sized ducts.
- D. Coordination with Existing Conditions and with other Trades:
  - 1. Coordinate the installation of ductwork with existing conditions and the work of other trades to allow the installation of ductwork and the proper operation of dampers and operators.
  - 2. Where existing thread rod, strut material, miscellaneous supports, conduit, or piping under 1-inch diameter obstructs the passage of the ductwork, they shall be relocated by the Contractor at no additional cost to the Owner. Coordinate the work with other trades.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials, duct liner, duct connections, and duct fittings.
- C. Shop Drawings: Submit duct fabrication drawings, drawn to scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as Contract Documents, indicating:
  - 1. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other work.

2. Duct layout, indicating pressure classifications and sizes in plan view. For exhaust duct systems, indicate classification of materials handled as defined in this section.
  3. Fittings.
  4. Reinforcing details and spacing.
  5. Seam and joint construction details.
  6. Penetrations through fire rated and other walls.
  7. Terminal unit, coil, and humidifier installations.
  8. Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.
- D. Manufacturer's Installation Instructions: Indicate special procedures for glass fiber ducts.
- E. Manufacturer's Certificate: Certify that installation of glass fiber ductwork meet or exceed recommended fabrication and installation requirements.
- F. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

#### **1.07 REGULATORY REQUIREMENTS**

- A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

#### **1.08 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 MATERIALS**

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Aluminum for Ducts: ASTM B209/B209M; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
1. 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.

2. VOC Content: Not more than 250 g/L, excluding water.
3. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
4. For Use With Flexible Ducts: UL labeled.
5. Manufacturers:
  - a. Duro-Dyne; Model DSW: [www.durodyne.com](http://www.durodyne.com).
  - b. Hard Cast; Model RTA 50: [www.hardcast.com](http://www.hardcast.com).
  - c. Hard Cast; Model "Versa-Grip" 102: [www.hardcast.com](http://www.hardcast.com).
  - d. Sika; Model "Sikaflex": [www.sika.com](http://www.sika.com).
  - e. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
  1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
  5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
  6. Other Types: As required.
  7. Manufacturers:
    - a. Powers Fasteners, Inc.: [www.powers.com](http://www.powers.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- F. All Ducts: G90 Galvanized steel, unless otherwise indicated. Provide SMACNA pressure class as indicated or at a minimum meet or exceed the pressure rating of the connected fan. In no case less than 1/2 inch w.g. permitted.
- G. General Exhaust: 1 inch w.g. pressure class, galvanized steel. Use Aluminum in wet areas, like shower rooms.
- H. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

## 2.02 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Transfer Air and Sound Boots: 1/2 inch w.g. pressure class, fibrous glass.
- C. 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.
- D. Duct systems have been designed for metal duct.
- E. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

- F. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- G. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
- H. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- I. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- J. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- K. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

### **2.03 DUCT MANUFACTURERS**

- A. Streimer Sheet Metal: [www.streimer.com](http://www.streimer.com).
- B. General Sheet Metal: [www.gsmw.com](http://www.gsmw.com).
- C. Arctic Sheet Metal: [www.arcticsheetmetal.com](http://www.arcticsheetmetal.com).
- D. Robert Lloyd Sheet Metal: [www.rlsm.net](http://www.rlsm.net).
- E. Just Right Heating and Cooling: [www.justrightheat.com](http://www.justrightheat.com).

### **2.04 RECTANGULAR HVAC DUCTWORK**

- A. Manufacture: Equal or exceed the minimum wall thickness and reinforcing as scheduled in the SMACNA rectangular duct construction schedule to comply with duct pressure classifications specified. Cross break or bead all duct widths over 14 inches and horizontal surfaces to prevent ballooning or breathing.
- B. Fittings: Fabricate for easiest airflow.
  - 1. Branch tabs are to be 45 degrees entry with  $L = 1/4 W$  inches.
- C. Joints:
  - 1. Longitudinal: Pittsburg lock flooded with mastic. Snaplock is not allowed.
  - 2. Traverse: Demountable joint such as Ductmate for 36 inch width and above. Seal corners prior to assembly.

### **2.05 CASINGS**

- A. Fabricate casings in accordance with SMACNA (DCS) and construct for operating pressures indicated.
- B. Mount floor mounted casings on 4 inch high concrete curbs. At floor, rivet panels on 8 inch centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18 gage,

0.0478 inch expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.

- C. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.
  - 1. Provide clear wire glass observation ports, minimum 6 by 6 inch size.
- D. Fabricate acoustic casings with reinforcing turned inward. Provide 16 gage, 0.0598 inch sheet steel back facing and 22 gage, 0.0299 inch perforated sheet steel front facing with 3/32 inch diameter holes on 5/32 inch centers. Construct panels 3 inches thick packed with 4.5 lb/cu ft minimum glass fiber insulation media, on inverted channels of 16 gage, 0.0598 inch sheet steel.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Flexible Ducts: Connect to metal ducts with adhesive and draw bands
- E. Use sealant on all lapped round duct joint connections. Seal all ducts in accordance with State Energy Code.
- F. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- G. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- I. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- J. Install duct hangers and supports in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- K. Use double nuts and lock washers on threaded rod supports.
- L. Do not hang ductwork from un-poured metal pan deck without prior approval from project engineer regardless of what is indicated on the drawings.
- M. Connect terminal units supply ducts rigidly without flexible duct.
- N. Connect diffusers or light troffer boots to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.

- O. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.
- P. At exterior wall louvers, seal duct to louver frame.
- Q. For exposed ductwork provide escutcheon or flange at wall penetrations.

### 3.02 CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.
- B. Clean duct systems with high power vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

### 3.03 SCHEDULES

- A. Ductwork Material Schedule:

<u>AIR SYSTEM</u>	<u>MATERIAL</u>
Supply (Heating Systems)	Steel
Supply (System with Cooling Coils)	Steel
Return and Relief	Steel
General Exhaust	Steel
Outside Air Intake	Steel
Combustion Air	Steel

### 3.04 DUCTWORK PRESSURE CLASS SCHEDULE:

<u>AIR SYSTEM</u>	<u>PRESSURE CLASS</u>
Supply (Heating Systems)	2 inch wg (250 Pa)
Supply (System with Cooling Coils)	2 inch wg (500 Pa)
Return and Relief	1 inch wg (250 Pa)
General Exhaust	1 inch (250 Pa)

**END OF SECTION**



**SECTION 23 33 00**  
**AIR DUCT ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Duct access doors.
- D. Duct test holes.
- E. Flexible duct connectors.
- F. Volume control dampers.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- C. Section 23 31 00 - HVAC Ducts and Casings.
- D. Division 26 - Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.
- B. NFPA 92 - Standard for Smoke Control Systems; 2021.
- C. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2021.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors, and duct test holes.
- D. Manufacturer's Installation Instructions: Provide instructions for fire dampers and combination fire and smoke dampers.
- E. Project Record Drawings: Record actual locations of access doors, test holes, fire dampers, and fire and smoke dampers.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect dampers from damage to operating linkages and blades.

## **PART 2 PRODUCTS**

### **2.01 TURNING VANES**

- A. Manufacturers:
  - 1. Elgen All-Tight.
  - 2. Duro-Dyne Type VR.
  - 3. Or approved equivalent.
- B. Hat channel or embossed vane side rails with shop-fabricated, double-blade turning vanes of galvanized steel aligned in the short dimension. Individually adjustable.

### **2.02 AIR EXTRACTORS**

- A. Manufacturers:
  - 1. Carnes Type 1250; Style 3.
  - 2. Titus Type AG-45.
  - 3. Or approved equivalent.
- B. Multi-blade device with radius blades attached to pivoting frame with screw operator. Furnish on take-offs from main ducts adjacent to diffusers or grilles where a splitter is not used.

### **2.03 BACKDRAFT DAMPERS - METAL**

- A. Manufacturers:
  - 1. PCI Industries, Inc.; Pottorff Brand Model Series BD60: [www.pottorff.com](http://www.pottorff.com).
  - 2. Cesco; Model BAP-1: [www.cescoproducts.com](http://www.cescoproducts.com).
  - 3. Greenheck; Model Series EM: [www.greenheck.com](http://www.greenheck.com).
  - 4. Ruskin Company; BD/BDR: [www.ruskin.com](http://www.ruskin.com).
  - 5. Nailor; Model 1370/1380: [www.nailor.com](http://www.nailor.com).
  - 6. Tamco; Model BDD Series 7000 (aluminum): [www.tamco.ca](http://www.tamco.ca).
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
- C. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with 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.

## 2.04 DUCT ACCESS DOORS

- A. Manufacturers:
  - 1. Cesco; Model Series HF: [www.cescoproducts.com](http://www.cescoproducts.com).
  - 2. Greenheck; Model Series HAD/CAD: [www.greenheck.com](http://www.greenheck.com).
  - 3. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- 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 x 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.

## 2.05 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

## 2.06 FLEXIBLE DUCT CONNECTORS

- A. Manufacturers:
  - 1. Ventfabrics Ventlon.
  - 2. Duro-Dyne Durolon.
  - 3. Carlisle HVAC Products; Dynair Connector Plus G90 Steel Offset Seam Neoprene Fabric: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
  - 4. Elgen Manufacturing: [www.elgenmfg.com](http://www.elgenmfg.com).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Flexible Duct Connections: Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
    - a. Net Fabric Width: Approximately 3 inches wide.
  - 2. Metal: 3 inches wide, 24 gage thick galvanized steel.

- D. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.
- E. Maximum Installed Length: 14 inch.

## 2.07 VOLUME CONTROL DAMPERS

- A. Manufacturers:
  - 1. CESCO; Model Series MGF/MGG: [www.cescoproducts.com](http://www.cescoproducts.com).
  - 2. Greenheck; Model Series MBD/MBDR: [www.greenheck.com](http://www.greenheck.com).
  - 3. Nailor; Model 1110/1120 galvanized: [www.nailor.com](http://www.nailor.com).
  - 4. Tamco; Series 1000 (aluminum): [www.tamco.com](http://www.tamco.com).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Splitter Dampers:
  - 1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
  - 2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
  - 3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
  - 4. Manufacturers:
    - a. Krueger.
- D. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
  - 1. Fabricate for duct sizes up to 6 by 30 inch.
  - 2. Blade: 24 gage, minimum.
  - 3. Provide 1 1/2 inch standoff bracket with extended pin or approved equal.
  - 4. Manufacturers:
    - a. Greenheck MBD-10 or approved equal..
- E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
  - 1. Blade: 18 gage, minimum.
  - 2. Provide 1 1/2 inch standoff bracket with extended pin or approved equal.
  - 3. Manufacturers:
    - a. Greenheck MBD-15 or approved equal for 2-inch pressure.
- F. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

1. Product: 515A manufactured by Young Regulator.
- G. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
  2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
  3. Where rod lengths exceed 30 inches provide regulator at both ends.
  4. Manufacturers:
    - a. 443 Valcalox Regulator manufactured by Young Regulator.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- H. For non-accessible locations (hard ceiling): Provide each damper with adjustment and locking quadrant device as manufactured by Young Regulator No. 270-301 operator with BCW flexible casing and wire operator for non-accessible locations (hard ceiling), Ventlock, Durodyne or approved. Paint ceiling plate to match ceiling.

## **2.08 BAROMETRIC RELIEF DAMPERS**

- A. Manufacturers:
1. Greenheck: BR Series. [www.greenheck.com](http://www.greenheck.com).
  2. Nailor; Model BDD 1370CB: [www.nailor.com](http://www.nailor.com).
- B. Dampers shall consist of: 16 ga. insert mount galvanized steel hat channel frame with 5 in. depth; blades from 0.063 in. thick formed aluminum, eccentrically pivoted, 3/8 in. square plated steel axles with galvanized steel press-fit ball bearings; damper shall be equipped with pressure activated vinyl blade seals; and internal plated steel blade-to-blade linkage with blade mounted counterbalance weights.
- C. Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 2 in. wg, velocities to 2000 fpm and temperatures to 180 degrees F. Testing and ratings to be in accordance with AMCA 500-D.

## **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). Refer to Section 23 31 00 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 for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- G. Demonstrate re-setting of fire dampers to Owner's representative.
- H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- I. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- J. For fans developing static pressures of 5.0 inches and over, cover flexible connections with leaded vinyl sheet, held in place with metal straps.
- K. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- L. Use splitter dampers only where indicated.
- M. Provide balancing dampers on 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**

**SECTION 23 34 23**  
**HVAC POWER VENTILATORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Overhead Suspended Axial Connection Fans.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 05 13 - Common Motor Requirements for Plumbing Equipment.
- B. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- C. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.
- D. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AMCA 99 - Standards Handbook; 2016.
- B. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.
- C. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.
- D. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.;  
<http://www.amca.org/certified/search/company.aspx>.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
- G. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2021.
- H. UL 705 - Power Ventilators; Current Edition, Including All Revisions.
- I. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Fan Belts: Two sets for each individual fan.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## **PART 2 PRODUCTS**

### **2.01 POWER VENTILATORS - GENERAL**

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Conform to AMCA 99.
- E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- 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.

### **2.02 OVERHEAD SUSPENDED AXIAL CONVECTION FAN**

- A. Manufacturers:
  1. Greenheck.
  2. Big Ass Fans.
  3. Entrematic Fans.
- B. Construction:
  1. Blades: Anodized aluminum airfoils with tip winglets.
  2. Motor: DC direct drive, permanent magnet.
  3. Mounting: Provide with standard extension tube and manufacturer's mounting bracket and safety cable.
  4. Accessories: Provide hard wired, wall mounted, variable speed controller.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.



- D. Hung Cabinet Fans:
1. Install fans with resilient mountings and flexible electrical leads. Refer to Section 23 05 48.
  2. Install flexible connections specified in Section 23 33 00 between fan and ductwork.  
Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- E. Provide sheaves required for final air balance.
- F. Install backdraft dampers on inlet to roof and wall exhausters.
- G. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

**END OF SECTION**

**SECTION 23 37 00**  
**AIR OUTLETS AND INLETS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Diffusers:
  - 1. Perforated ceiling diffusers.
- B. Rectangular ceiling diffusers.
- C. Registers/grilles:
  - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.
  - 2. Wall-mounted, supply register/grilles.
  - 3. Wall-mounted, exhaust and return register/grilles.
- D. Louvers.
- E. Roof hoods.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 91 23 - Interior Painting: Painting of ducts visible behind outlets and inlets.

**1.03 REFERENCE STANDARDS**

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2015.
- B. ARI 890-2001 - Standard for Air Diffusers and Air Diffuser Assemblies; Air-Conditioning and Refrigeration Institute; 2008.
- C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (Reaffirmed 2011).
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

**1.05 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.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Carnes, a division of Carnes Company Inc.: [www.carnes.com](http://www.carnes.com).
- B. Krueger: [www.krueger-hvac.com](http://www.krueger-hvac.com).
- C. Price Industries: [www.price-hvac.com](http://www.price-hvac.com).
- D. Titus: [www.titus-hvac.com](http://www.titus-hvac.com).
- E. Nailor; [www.nailor.com](http://www.nailor.com).
- F. Metalaire [www.metalaire.com](http://www.metalaire.com)
- G. Shoemaker; [www.shoemakermfg.com](http://www.shoemakermfg.com).
- H. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 RECTANGULAR CEILING DIFFUSERS**

- A. Manufacturers:
  - 1. Carnes Model Series SK.
  - 2. Price Model SMD.
  - 3. Krueger Model SHPC.
  - 4. Titus Model TDC.
  - 5. Nailor; Model 6500.
  - 6. Metalaire Model 5500S
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type: Provide square and rectangular, multi-louvered diffuser to discharge air in indicated pattern.
- C. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Fabrication: Steel with baked enamel finish.
- E. Accessories: Provide radial opposed blade, butterfly, and combination splitter volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing grid, operating rod extension, anti-smudging device, and gaskets for surface mounted diffusers with damper adjustable from diffuser face.

### **2.03 PERFORATED FACE CEILING DIFFUSERS**

- A. Manufacturers:
  - 1. Carnes Model Series SPMB.
  - 2. Price Model PDMC.
  - 3. Krueger Model 1240P.
    - a. Titus Model PMC.
  - 4. Nailor; Model 4320M.
  - 5. Metalaire Model 7950

6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type: Perforated face with fully adjustable pattern and removable face.
- C. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Fabrication: Stainless steel.
- E. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

#### **2.04 CEILING EXHAUST AND RETURN GRILLES (PERFORATED)**

- A. Manufacturers:
  1. Carnes Model Series RTFA.
  2. Price Model PDDR.
  3. Krueger Model 6290/6590.
  4. Titus Model PAR.
  5. Nailor; Model 51EC.
  6. Metalaire Model 7500R
  7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type: Perforated face with fully adjustable, round or square neck as indicated on the Drawings and removable face.
- C. Frame: As required for the ceiling type. In plaster ceilings, furnish plaster frame and ceiling frame.
- D. Fabrication: Steel with steel frame and baked enamel off-white finish.
- E. Accessories: Radial opposed-blade or butterfly damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

#### **2.05 CEILING EGG CRATE EXHAUST AND RETURN GRILLES**

- A. Manufacturers:
  1. Carnes Model Series RATB.
  2. Price Model Series 81.
  3. Krueger Model EGC5.
  4. Titus Model 50F.
  5. Nailor; Model 61DH.
  6. Metalaire Model CC5
  7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type: Egg crate style face consisting of 1/2 by 1/2 by 1/2 inch grid core.
- C. Fabrication: Grid core consists of aluminum with mill aluminum finish.
- D. Frame: 1-1/4 inch margin with countersunk screw mounting.
- E. Frame: Channel lay-in frame for suspended grid ceilings.

- F. Accessories: Provide integral, gang & face operated opposed blade damper with removable key operator, operable from face.

## **2.06 WALL SUPPLY REGISTERS/GRILLES**

- A. Manufacturers:
  - 1. Carnes Model Series RTDB.
  - 2. Price Model Series 520.
  - 3. Krueger Model 880.
  - 4. Titus Model 300RL.
  - 5. Nailor; Model 6145H.
  - 6. Metalaire Model H4004S.
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. 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, single deflection.
- C. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- D. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- E. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.
- F. Gymnasiums: Provide front pivoted or welded in place blades, securely fastened to be immobile.

## **2.07 WALL EXHAUST AND RETURN REGISTERS/GRILLES**

- A. Manufacturers:
  - 1. Carnes Model Series RSAB.
  - 2. Price Model Series 530.
  - 3. Krueger Model S80.
  - 4. Titus Model 350RL.
  - 5. Nailor; Model 49-241.
  - 6. Metalaire Model SRH.
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.
- C. Frame: 1-1/4 inch margin with countersunk screw mounting.
- D. Fabrication: Steel frames and blades, with factory baked enamel finish.
- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

- F. Gymnasiums: Provide front pivoted or welded in place blades, securely fastened to be immobile.

## 2.08 LOUVERS

- A. Manufacturers:
  - 1. Greenheck Model ESK-402.
  - 2. Ruskin Model ELF811SH.
  - 3. Cesco Model X4K4.
  - 4. Nailor; Model 1604D.
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type: 4 inch deep frame with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over intake or exhaust end.
- C. Fabrication: 12 gage thick extruded aluminum, welded assembly, with factory anodized finish.
- D. Color: To be selected by Architect from manufacturer's standard range.
- E. Mounting: Furnish with flanging and anchors as required for installation. Do not use exterior flange.

## 2.09 ROOF HOODS

- A. Manufacturers:
  - 1. Greenheck Model "Fabra Hood".
  - 2. Cesco Model EHA/IHA.
  - 3. Cook Model VI/VR.
  - 4. Carnes Model GI/GE.
  - 5. Twin City Fans; Model MGI/MGR.
  - 6. Acme IV/EV.
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fabricate air inlet or exhaust hoods in accordance with SMACNA (DCS).
- C. Fabricate of galvanized steel, minimum 16 gage, 0.0598 inch base and 20 gage, 0.0359 inch hood, or aluminum, minimum 16 gage, 0.0598 inch base and 18 gage, 0.0598 inch hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake, and factory prime coat finish.
- D. Fabricate louver penthouses with mitered corners and reinforce with structural angles.
- E. Mount unit on minimum 12 inch high curb base with insulation between duct and curb.
- F. Make hood outlet area minimum of twice throat area.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

**END OF SECTION**

**SECTION 23 72 23**  
**PACKAGED AIR-TO-AIR ENERGY RECOVERY UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Energy recovery units.
- B. Vibration isolation.
- C. Power and controls.
- D. Accessories.
- E. Service accessories.

**1.02 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; 2020.
- B. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019.
- C. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.
- C. Shop Drawings: Show design and assembly of energy recovery unit and installation and connection details.
- D. Samples: Submit sample showing custom paint colors.
- E. Manufacturer's Qualification Statement.
- F. Closeout Submittals: Submit manufacturer's operation and maintenance instructions.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Spare Parts: One of each kind of filter.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  - 1. Firm regularly engaged in manufacturing energy recovery units.



2. Products in satisfactory use in similar service for not less than five years.
- B. The energy recovery ventilator shall be Certified by the Home Ventilating Institute (HVI) under CSA 439\*. Both a heating and a cooling test must be run to demonstrate year round energy recovery.
- C. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL 723.

### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store in manufacturer's unopened packaging.
- B. Store products to be installed indoors in dry, heated area.

### **1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of five years from the date of purchase.

## **PART 2 PRODUCTS**

### **2.01 ENERGY RECOVERY UNITS (ERV-1)**

- A. Manufacturers:
  1. Mitsubishi Lossnay; Model LGH.
  2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Continuous Ventilation: Unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters, or defrost cycles under normal operating conditions.
- C. Construction:
  1. The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.
  2. Unit shall be capable of operating in both winter and summer conditions without generating condensate.
  3. The unit case shall be constructed of 24-gauge steel, with lapped corners and zinc-plated screw fasteners. The case shall be finished with textured, powder coat paint (GR90 case shall be constructed of G90 galvanized steel.)
  4. Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall have an airtight compression seal using closed cell foam gaskets.

5. Case walls and doors shall be fully insulated with 1 inch, expanded polystyrene foam insulation faced with a cleanable foil face on all exposed surfaces.
  6. The ERV cores shall be protected by a MERV-8 rated, spun polyester, disposable filter in both airstreams.
- D. Motors:
1. The supply and exhaust fans shall be electronically commutated (EC) Motors with multi-speed capability as standard offering.
- E. Unit Controls:
1. Unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters, or defrost cycles under normal operating conditions.
  2. Run unit under constant speed during occupied, ON/OFF from time clock or schedule .
  3. The unit shall have an internal 24 VAC transformer and relay.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

#### **3.02 INSTALLATION**

- A. Unit Location:
1. Locate, orient, and connect ductwork per AMCA, ASHRAE, and SMACNA guidelines. Provide service clearances as indicated on the plans. Locate units distant from sound critical occupancies.
  2. Use integral mounting flange and hanging bar system to mount the unit per manufacturer's installation manuals to a structurally suitable surface. The units may be mounted in any orientation.
- B. Vibration Isolation:
1. Utilize factory supplied Neoprene pads to help provide vibration isolation for the unit.
  2. Provide flexible duct connections at unit duct flanges.
- C. Duct Design:
1. All ductwork shall be designed, constructed, supported and sealed in accordance with SMACNA HVAC Duct Construction Standards and pressure classifications.
  2. At a minimum all duct runs to the outdoors shall be thermally insulated at levels appropriate to the local climate. A continuous vapor barrier shall also be provided on warm surface of the insulation.
- D. Test and Balancing:

1. Test and Balancing may not begin until 100% of the installation is complete and fully functional.
2. Follow National Environmental Balancing Bureau (NEBB) air test and balance procedures specific to energy recovery devices. Provide balancing reports to owner's representatives.

### **3.03 CLEANING**

- A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.

**END OF SECTION**

**SECTION 23 81 26**  
**SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Indoor air handling (fan and coil) units for ducted systems.
- B. Refrigerant piping.
- C. Refrigerant piping insulation.
- D. Equipment stands.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Mounting pad for outdoor unit.
- B. Section 22 10 05 - Plumbing Piping: Includes indoor coil condensate drain, water supply for humidifier, and the like.
- C. Section 22 30 00 - Plumbing Equipment: Cooling condensate removal pumps.
- D. Section 23 07 19 - HVAC Piping Insulation.
- E. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Thermostats, humidistats, time clocks.
- F. Section 23 11 23 - Facility Natural-Gas Piping.
- G. Section 23 11 26 - Facility Liquefied-Petroleum Gas Piping.
- H. Section 23 31 00 - HVAC Ducts and Casings.
- I. Section 23 51 00 - Breechings, Chimneys, and Stacks: Flue or stack.
- J. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.
- K. Section 31 23 16.13 - Trenching: Excavation and backfill for buried refrigerant lines and electrical conduits.

**1.03 REFERENCE STANDARDS**

- A. ACGIH - Ultraviolet Radiation: TLV(R) Physical Agents 7th Edition Documentation 2010.
- B. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment 2023.
- C. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment 2015, with Addendum (2016).
- D. AHRI 520 - Performance Rating of Positive Displacement Condensing Units 2004.
- E. ASHRAE Std 15 - Safety Standard for Refrigeration Systems 2022, with Errata (2023).
- F. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant 2019.

- G. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size 2017, with Addendum (2022).
- H. 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.
- I. ASHRAE Std 90.2 - Energy-Efficient Design of Low-Rise Residential Buildings 2018, with Addendum (2023).
- J. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers 2022.
- K. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- L. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.
- M. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service 2020.
- N. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
- O. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2023).
- P. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-- Tension 2016 (Reapproved 2021).
- Q. ASTM D570 - Standard Test Method for Water Absorption of Plastics 2022.
- R. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces 2008 (Reapproved 2019).
- S. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.
- T. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- U. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).
- V. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2023).
- W. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.
- X. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- Y. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials 2013 (Reapproved 2021).

- Z. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding. 2011 and errata.
- AA. NEMA MG 1 - Motors and Generators 2021.
- BB. NFPA 54 - National Fuel Gas Code 2021.
- CC. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2024.
- DD. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2024.
- EE. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances 2019.
- FF. UL 153 - Portable Electric Luminaires Current Edition, Including All Revisions.
- GG. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical Current Edition, Including All Revisions.
- HH. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- II. UL 1995 - Heating and Cooling Equipment Current Edition, Including All Revisions.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Design Data: Indicate refrigerant pipe sizing.
- E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- F. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.
- G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- H. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- I. Project Record Documents: Record actual locations of components and connections.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Filters: One for each unit, of each type and size.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience and approved by manufacturer.

#### **1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide three year manufacturers warranty for solid state ignition modules.
- C. Provide five year manufacturers warranty for heat exchangers, condensing units, and compressors.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Trane Inc / Mitsubishi; Model PVFY / MXZ Hyper Heat: [www.trane.com/#sle](http://www.trane.com/#sle).
- B. Carrier Corporation / Toshiba[<>]: [www.carrier.com/#sle](http://www.carrier.com/#sle).
- C. Daikin: [www.daikin.com](http://www.daikin.com).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 SYSTEM DESIGN**

- A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
  - 1. Heating and Cooling: Air-source electric heat pump located in outdoor unit with evaporator; auxiliary electric heat.
  - 2. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- B. Performance Requirements: See Drawing Schedule for requirements .
- C. Electrical Characteristics:
  - 1. Refer to schedule and Division 26.
  - 2. Disconnect Switch: Factory mount disconnect switch on equipment under provisions of Section 26 05 83.

#### **2.03 INDOOR AIR HANDLING UNITS FOR DUCTED SYSTEMS (FCU-1, 2)**

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
  - 1. Air Flow Configuration: Counterflow, with additional steel base.
  - 2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
- B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
  - 1. Motor: NEMA MG 1; 1750 rpm single speed, permanently lubricated, hinge mounted.

2. Motor Electrical Characteristics:
  - a. As scheduled.
- C. Air Filters: 1 inch thick glass fiber, disposable type arranged for easy replacement.
- D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
  1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
  2. Manufacturers: System manufacturer.

#### **2.04 OUTDOOR UNITS (HP-1, 2)**

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
  1. Comply with AHRI 210/240.
  2. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
  3. Refrigerant: R-410A.
  4. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
  5. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1.
  6. Sound Rating: 69 dBA, when measured in accordance with AHRI 270.
- B. Compressor: Hermetic, two speed 1800 and 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.
- C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
  1. Condenser Fans: Direct-drive propeller type.
  2. Condenser Fan Motor: Enclosed, permanently lubricated.
- D. Coil: Air-cooled, aluminum fins bonded to copper tubes.
- E. Accessories: Filter drier, high-pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
  1. Provide thermostatic expansion valves.
  2. Provide heat pump reversing valves.
- F. Operating Controls:
  1. Control by room thermostat to maintain room temperature setting.



2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to 0 degrees F.
- G. Mounting Pad: Precast concrete parking bumpers, minimum 4 inches square; minimum of two located under cabinet feet.
  1. Grade: Reinforced concrete pad; see Structural.
  2. Roof: PHP Systems Designs: [www.phpsd.com](http://www.phpsd.com).

## 2.05 ACCESSORY EQUIPMENT

- A. Economizer Damper Units: Steel cabinet with baked enamel finish, easily removed and secured access doors, glass fiber insulation.
  1. Dampers: Formed steel with nylon bearings and gaskets.
  2. Damper Operator: 24 volt, modulating spring return motor with adjustable minimum position switch.
  3. Control Wiring: Provide wiring harness consisting of control board with relays, wiring harness, transformer, and hardware.
  4. Controls: Discharge air thermostat, adjustable outdoor air "enthalpy" control, return air "enthalpy" sensor position dampers, and interface to room thermostat.
- B. Room Thermostat: Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:
  1. System selector switch (heat-off-cool) and fan control switch (auto-on).
  2. Automatic switching from heating to cooling.
  3. Preferential rate control to minimize overshoot and deviation from setpoint.
  4. Set-up for four separate temperatures per day.
  5. Instant override of setpoint for continuous or timed period from one hour to 31 days.
  6. Short cycle protection.
  7. Programming based on every day of the week.
  8. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
  9. Battery replacement without program loss.
  10. Thermostat Display:
    - a. Time of day.
    - b. Actual room temperature.
    - c. Programmed temperature.
    - d. Programmed time.
    - e. Duration of timed override.
    - f. Day of week.
    - g. System Mode Indication: Heating, Cooling, Fan Auto, Off, and On, Auto or On, Off.

11. Manufacturers:
  - a. Carrier Corporation: [www.carrier.com/#sle](http://www.carrier.com/#sle).
  - b. Trane Inc: [www.trane.com/#sle](http://www.trane.com/#sle).
  - c. York International Corporation / Johnson Controls: [www.york.com/#sle](http://www.york.com/#sle).
  - d. Honeywell: [www.honeywell.com](http://www.honeywell.com).
  - e. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.06 SYSTEM REFRIGERANT PIPING

- A. Comply with requirements in Section 23 23 00 - Refrigerant Piping for system piping requirements.
- B. Refrigerant Piping:
  1. Copper Tube: ASTM B280, Type ACR.
  2. Wrought-Copper Fittings: ASME B16.22.
  3. Brazing Filler Metals: AWS A5.8/A5.8M.
  4. Insulation: Insulate both heat pump refrigerant lines. Insulate all three refrigerant lines from heat recovery outdoor units to MCU.
- C. Refrigerant Tubing Kits:
  1. Factory-rolled and -bundled, soft-copper tubing with tubing termination fittings at each end.
  2. Modular systems require outdoor refrigerant kits for module connections.
  3. Standard one-piece length for connecting to indoor units.
  4. Pre-insulated with flexible elastomeric insulation of thickness to comply with governing energy code and sufficient to eliminate condensation.
  5. Factory Charge: Dehydrated air or nitrogen.
- D. Divided-Flow Specialty Fittings: Where required by VRF HVAC system manufacturer for proper system operation, VRF HVAC system manufacturer shall furnish specialty fittings with identification and instructions for proper installation by Installer.
  1. Indoor Y-Joint Fittings: Piping to multiple indoor units requires additional piping components. Use VRF HVAC system manufacturer's Y-joint fittings to branch the main refrigerant lines.
  2. Outdoor Y-Joint Fittings: VRF HVAC system manufacturer's Y-joint fittings must be used to connect outdoor units when multiple module systems are being installed (systems with more than one outdoor unit).
- E. Refrigerant Isolation Ball Valves:
  1. Description: Uni-body full port design, rated for maximum system temperature and pressure, and factory tested under pressure to ensure tight shutoff. Designed for valve operation without removing seal cap.

2. Seals: Compatible with system refrigerant and oil. Seal service life of at least 20 years.
3. Valve Connections: Flare or sweat depending on size.

## **2.07 FLEXIBLE ELASTOMERIC CELLULAR INSULATION**

- A. Manufacturers:
  1. AP Armacell LLC; Armaflex Black LapSeal: [www.armacell.us/#sle](http://www.armacell.us/#sle).
  2. K-Flex USA LLC; Insul-Lock DS: [www.kflexusa.com/#sle](http://www.kflexusa.com/#sle).
  3. Haldstead; Model "Insul-Tube".
  4. Substitutions: See Section 01 60 00 - Product Requirements.
- 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: 180 degrees F.
  3. Connection: Waterproof vapor barrier adhesive.
- C. Application: Refrigerant piping.
- D. Tape: AP Armaflex Black Lap Seal, 2 inch width, self adhesive for secondary seam security for butt seams.
- E. Fittings: AP Armaflex prefabricated fittings. 3-piece elbows and tees, as intended by manufacturer for straight or grooved piping. Field fabricated fittings are not acceptable.
- F. Support: Armaflex Eco Light insulated support with load bearing PET core to protect insulation from damage. Provide with PVC foil cladding.

## **2.08 ENGINEERED WALL OUTLET SEALS AND REFRIGERANT PIPING INSULATION PROTECTION**

- A. Manufacturers:
  1. Airex Manufacturing, Inc: [www.airexmfg.com/#sle](http://www.airexmfg.com/#sle).
  2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Basis of Design: Airex Manufacturing, Inc; [www.airexmfg.com/#sle](http://www.airexmfg.com/#sle).
  1. Pipe Penetration Wall Seal: Airex Titan Outlet.
  2. Refrigeration Pipe Insulation Protection System: Airex E-Flex Guard.
  3. Pipe Penetration Wall Seal and Insulation Protection System: Airex Pro-System Kit.
- C. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
  1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
    - a. Elastomeric Sleeve Diameter: 1-11/16 inch minimum.
  2. Wall Outlet Size, Siding and Compact Applications: 6-7/8 inch wide by 3-7/8 inch high.
    - a. Elastomeric Sleeve Diameter: 1-11/16 inch minimum.
  3. Outlet Cover Color: Gray.

4. Water Penetration: Comply with ASTM E331.
  5. Air Leakage: Comply with ASTM E283.
  6. Air Permeance: Comply with ASTM E2178.
- D. Insulation Protection System: Refrigerant piping insulation PVC protective cover.
1. PVC Insulation Cover Color: Black with full-length velcro fastener.
  2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
  3. Water/Vapor Permeability: Comply with ASTM E96/E96M.
  4. Anti-Fungal and Anti-Microbial Resistance: Comply with ASTM G21.
  5. Flame Spread and Smoke Development Rating of 24/450: Comply with ASTM E84.
  6. Carbon Arc Light Exposure: Comply with ASTM G153.
  7. Tensile Strength After UV Exposure and Water Immersion: Comply with ASTM D412.
  8. Water Absorption of Plastics: Comply with ASTM D570.
  9. Adhesive free.

## 2.09 ACCESSORIES

- A. General Requirements:
1. Provide required accessories in accordance with and subject to the recommendations of the insulation manufacturer.
  2. Furnish compatible materials which do not contribute to corrosion, soften, or otherwise attack surfaces to which applied, in either the wet or dry state.
  3. Comply with ASTM C795 requirements for materials to be used on stainless steel surfaces.
  4. Supply materials that are asbestos free.
- B. Corrosion Inhibitors:
1. Corrosion Control Gel:
    - a. Manufacturers:
      - 1) Polyguard Products; RG2400LT: [www.polyguardproducts.com/#sle](http://www.polyguardproducts.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
    - b. Corrosion Protection: Comply with ASTM B117 and ASTM D610.

## 2.10 PREFABRICATED MOUNTING STAND

- A. Manufacturer:
1. Quick-Sling Model QSMS 2402
- B. Each Quick-Sling Mini Split Dual Fan Stand is made of 14-gauge square, steel tubing, and 11 gauge steel cross rails. This feature helps to cut down on vibration and enables the stand to hold up to 400 lbs. Each foot is 6" x 6" 11 gauge steel and is adjustable up to 1.25" in height. Four (4) 3/8" holes allow the stand to be bolted to any surface for safety and stability. Fifty-derometer rubber foot pads and 4 anti-vibration isolation washers are included. The stands are

available in 12", 18", and 24" height, 30.5" width and 38" depth. The 18" and 24" stands are equipped with additional stabilization arms.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.
- D. Verify that water supply is available for humidifier.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Provide vent connections in accordance with NFPA 211.
- E. Install refrigeration systems in accordance with ASHRAE Std 15.
- F. Mount counterflow furnaces installed on combustible floors on additive base.
- G. Pipe drain from cooling coils and humidifiers to nearest floor drain.
- H. Glue and tape all elastomeric insulation butt seams air tight per manufacturer's recommendations to avoid condensation between pipe and insulation.
- I. Use manufacturer's insulated pipe support to provide continuous insulation through the support.
- J. Fully coat all exterior elastomeric insulated pipe with UV resistant and moisture resistant paint.

**END OF SECTION**

**SECTION 23 82 16**  
**AIR COILS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electric coils.

**1.02 RELATED REQUIREMENTS**

- A. Section 23 07 19 - HVAC Piping Insulation.
- B. Section 23 31 00 - HVAC Ducts and Casings: Installation of duct coils.
- C. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils; 2001, with Addendum (2011).
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
- C. Shop Drawings: Indicate coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
- D. Certificates: Certify that coil capacities, pressure drops, and selection procedures meet or exceed specified requirements.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors.
- B. Protect coils from entry of dirt and debris with pipe caps or plugs.

**1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

## **PART 2 PRODUCTS**

### **2.01 ELECTRIC COILS (EDH-1)**

- A. Manufacturers:
  - 1. INDEECO (Industrial Engineering and Equipment Company): [www.indeeco.com/#sle](http://www.indeeco.com/#sle).
  - 2. Warren Technology: [www.warrenhvac.com](http://www.warrenhvac.com).
  - 3. Greenheck; Model IDHE: [www.greenheck.com](http://www.greenheck.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Assembly: UL listed and labelled, with terminal control box and hinged cover, splice box, coil, casing, and controls.
- C. Coil: Enclosed copper tube, aluminum finned element of coiled nickel-chrome resistance wire centered in tubes and embedded in refractory material.
- D. Casing: Die formed channel frame of 16 gage galvanized steel with 3/8 inch mounting holes on 3 inch centers. Provide tube supports for coils longer than 36 inches.
- E. Controls: Automatic reset thermal cut-out, built-in magnetic contactors, control circuit transformer and fuse, manual reset thermal cut-out, air flow proving device, fused disconnect, load fuses.
- F. Electrical Characteristics:
  - 1. Refer to Division 26.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's written instructions.
- B. Install in ducts and casings in accordance with SMACNA (DCS).
  - 1. Support coil sections independent of piping on steel channel or double angle frames and secure to casings.
  - 2. Provide frames for maximum three coil sections.
  - 3. Arrange supports to avoid piercing drain pans.
  - 4. Provide airtight seal between coil and duct or casing.
  - 5. Refer to Section 23 31 00.
- C. Protect coils to prevent damage to fins and flanges. Comb out bent fins.
- D. Install coils level. Install cleanable tube coils with 1:50 pitch.
- E. Make connections to coils with unions and flanges.
- F. Insulate headers located outside air flow as specified for piping. Refer to Section 23 07 19.
- G. Electric Duct Coils: Wire in accordance with NFPA 70. Refer to Division 26.

**END OF SECTION**

**SECTION 23 83 00**  
**RADIANT HEATING AND COOLING UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electric infrared radiant heaters.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 08 31 00 - Access Doors and Panels.
- C. Section 23 07 16 - HVAC Equipment Insulation.
- D. Section 23 07 19 - HVAC Piping Insulation.
- E. Section 23 09 13 - Instrumentation and Control Devices for HVAC.
- F. Section 23 09 93 - Sequence of Operations for HVAC Controls.
- G. Section 26 05 34 - Conduit for Electrical Systems.
- H. Section 26 05 37 - Boxes for Electrical Systems.
- I. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.  
Installation of room thermostats. Electrical supply to units.

**1.03 REFERENCE STANDARDS**

- A. ASHRAE Std 138 - Method of Testing for Rated Ceiling Panels for Sensible Heating and Cooling; 2021.
- B. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2020.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021.
- D. DIN EN 14037-3 - Free hanging heating and cooling surfaces for water with a temperature below 120 Degrees C - Part 3: Prefabricated ceiling mounted radiant panels for space heating- Rating method and evaluation of radiant thermal output; 2016.
- E. ISO 9001 - Quality Management Systems-Requirements; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 2021 - Fixed and Location Dedicated Electric Room Heaters; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.



### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for electric infrared radiant heaters.
- C. Shop Drawings: Indicate electric infrared radiant heaters layout, electrical terminations, thermostats, controls, and branch circuit connections.
- D. Manufacturer's Installation Instructions: Indicate installation instructions and recommendations.
- E. Field Quality Control Submittals: Indicate test reports and inspection reports.
- F. Project Record Documents: Record actual locations of infrared heaters and thermostats.
- G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions of equipment and controls, installation instructions, maintenance and repair data, and parts listings.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Data:
  - 1. Include repair methods and parts list of components.
  - 2. See Section 01 60 00 - Product Requirements, for additional provisions.

### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

### **1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide 5 year manufacturer's warranty for electrical elements.

## **PART 2 PRODUCTS**

### **2.01 ELECTRIC INFRARED RADIANT HEATERS (RH-1 TO 5)**

- A. Manufacturers:
  - 1. Detroit Radiant Products: Model ELX.
  - 2. INDEECO (Industrial Engineering and Equipment Company): [www.indeeco.com/#sle](http://www.indeeco.com/#sle).
  - 3. Marley Engineered Products: [www.marleymep.com/#sle](http://www.marleymep.com/#sle).
  - 4. TPI Corporation: [www.tpicorp.com/#sle](http://www.tpicorp.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
- C. Factory assembled including heating element, reflector, heater housing, mounting brackets, element holders, wire guards, and high temperature internal wiring for non-residential, indoor use only.
- D. Heating Element:
  - 1. Minimum 3/8 inch diameter quartz tube with coiled resistor wire.
  - 2. Element operating temperature range: 1200 to 1800 degrees F.
- E. Heater Housing:
  - 1. Factory fabricated from aluminum clad steel, stainless steel, aluminum, or low carbon steel for indoor use as indicated.
  - 2. Provide with baked enamel finish over corrosion-resistant primer.
  - 3. Furnish chrome plated or stainless steel wire guard designed to protect heating elements from damage.
  - 4. Supply mounting chain(s) to position heater in any horizontal angle.
- F. Reflector: Anodized aluminum. Wire symmetric design.
- G. Wiring:
  - 1. Fully enclosed internal wiring.
  - 2. Provide minimum 6 inch slack fixture (heater) wire for connection to branch circuit wiring.
- H. Accessories:
  - 1. Electric clock controller with self-starting synchronous motors and snap acting switch, rated for 125 percent of the load which it controls.
  - 2. 30 second time cycle with infinitely adjustable "on-off" period each cycle.
  - 3. External indicating knob for controller with manual adjustment from 0 to 100 percent.
  - 4. Surface Mounted Heater: Steel enclosure with baked enamel finish over corrosion resistant primer.
  - 5. Flush Mounted Heater: Galvanized steel enclosure with knockouts for conduit in bottom and sides.
  - 6. Connection wiring diagram on inside cover of enclosure.
  - 7. High duty-cycle contactors (pilot devices).
- I. Electrical Characteristics:
  - 1. Refer to Drawings.
  - 2. See Section 26 05 83.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Electric Infrared Radiant Heaters: Verify and maintain minimum distances from combustibles. Verify heater installation is not in a hazardous location.

### **3.02 PREPARATION**

- A. Clean all surfaces prior to installation.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's recommendations.
- B. Electric Infrared Radiant Heaters:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Comply with applicable codes.
  - 3. Maintain minimum distances from all combustibles in accordance with manufacturer's instructions and applicable codes.
  - 4. Field install quartz elements as recommended by the manufacturer.
  - 5. Suspend heater with chains, so that quartz tubes are horizontal, preventing sagging and premature burnout.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Provide manufacturer's field representative to test, inspect, instruct, and observe.
- C. Electric Infrared Radiant Heaters:
  - 1. Perform the following field tests and inspections and prepare test reports:
    - a. Operate electric heating elements to verify proper operation and electrical connections.
    - b. Test and adjust controls and safeties.
  - 2. Remove and replace malfunctioning units and retest as specified above.

### **3.05 CLEANING**

- A. Radiant Ceiling Panel Heaters: Remove paint splatters, other spots, dirt, and debris.

### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstrate Operation of Controls for the following Equipment:
  - 1. Electric Infrared Heaters.

**3.07 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.

**END OF SECTION**

**SECTION 26 00 01**  
**BASIC ELECTRICAL MATERIALS AND METHODS**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. Perform work in accordance with regulations of serving electrical utility, telephone utility, National Electrical Code, National Electrical Safety Code, National Fire Codes, International Building Code, and other applicable codes.
- B. Whenever the requirements of the Electrical Specifications or Drawings exceed those of the applicable code or standard, the requirements of the Specifications and Drawings shall govern.
- C. This Contractor is bound by the General Conditions, Supplementary Conditions, Special Conditions, and Division 1 bound herewith in addition to this Specification and accompanying Drawings.
- D. Bidders shall view the site and shall include costs incurred by existing conditions in the bid proposal.

**1.02 QUALITY ASSURANCE**

- A. Materials shall be new, of manufacturer's latest design and of the best quality. The materials shall be manufactured in accordance with applicable standards of NEMA, ANSI, or UL and shall be UL listed.
- B. Complete each system as shown and place in operation except where only rough-in or partial systems are called for. Each system shall be tested and left in proper operation free of faults, shorts, or unintentional grounds.
- C. Protect electrical work, wire and cable, materials and equipment installed under this Division against damage by other trades, weather conditions, or any other causes. Equipment found damaged or in other than new condition will be rejected as defective.

**1.03 FEES**

- A. Secure and pay for necessary permits and fees. Arrange for required inspections.

**PART 2 PRODUCTS**

**2.01 MATERIALS AND METHODS**

- A. Equipment and materials shall be new and free from defects. Material and equipment of the same or a similar type shall match that of the manufacturer and model number predominantly existing on the project. Standard production materials shall be used wherever possible.
- B. Work under this division shall be conducted in a manner to cooperate with other trades and contracts involved with this project.
- C. Consult drawings and specifications for this project and verify the requirements of equipment by other divisions, the Owner or by other contracts prior to installation and connection.

- D. Consult the drawings of other divisions to avoid conflicts with cabinets, counters, equipment, structural members, etc. Resolve any conflicts with the Architect prior to rough-in.
- E. Verify connection requirements for equipment specified or shown and provide materials and labor required to connect the equipment.
- F. Provide painting of electrical items as required by the Architect.
- G. Provide painting in accordance with Division 9 of these specifications.

## **2.02 INSTALLATION REQUIREMENTS**

- A. Electrical plans are diagrammatic. Verify exact equipment locations for equipment. Coordinate with architectural drawings and installations to avoid conflicts. Equipment size and location of equipment is shown wherever possible. Make use of the data in the contract documents and verify this information against actual field conditions. As applicable to the work to be performed, the materials and installation shall conform to the available space, avoid obstruction, preserve headroom, maintain required accessibility, and satisfy the requirements of the governing codes and the standards of good practice. Coordinate with other divisions' drawings and installation to avoid conflicts.
- B. Work shall be installed in a neat, inconspicuous, professional manner. Conduit runs shall parallel structural lines where exposed. Conduit shall run parallel to structural lines whenever possible and specifically when exposed. Whenever possible conduits shall be either concealed in the room ceiling, walls, floor, or exposed ceiling areas tight under the top chord of the ceiling bar joist, or running parallel to the roof wide flange beams, mounted tight to the vertical webs. No conduit shall be run perpendicular to the ceiling roof beams under the bottom chords. No exposed conduit is allowed without prior approval of the Architect. Flexible conduit is allowed only with prior approval of the Architect or Engineer of record.
- C. Existing raceways which are empty may be used whenever possible.
- D. The site shall be left clean and free of dirt and debris. Panels, fixtures, outlets and equipment shall be left clean and free of foreign materials and dirt.

## **2.03 COORDINATION**

- A. Work under this division shall be conducted in a manner to cooperate with other trades and contracts involved with this project.
- B. Consult drawings and specifications for this project and verify the requirements of equipment by other divisions, the Owner, or by other contracts prior to installation and connection.
- C. Consult drawings of other divisions to avoid conflicts with cabinets, counters, equipment, structural members, etc. Resolve any conflicts with the Architect prior to rough-in.
- D. Contact the electrical utility companies associated with the project and coordinate the final installation requirements with each utility prior to ordering equipment and beginning installation. Acquire utility installation documents and include costs to provide electrical materials and labor noted by the utility to be provided by the Owner (or customer).

**PART 3 EXECUTION**

**3.01 GUARANTEE**

- A. Guarantee the electrical installation against defects in materials, equipment, and workmanship for one year after the date of acceptance of the work. Defects shall be properly remedied to the satisfaction of the Architect at no cost to the Owner.

**END OF SECTION**

## SECTION 26 05 19

### 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. Oxide inhibiting compound.
- E. Wire pulling lubricant.
- F. Cable ties.

##### 1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 26 00 01 - Basic Electrical Materials and Methods.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- D. Section 26 05 53 - 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 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- 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.
- G. FS A-A-59544 - Cable and Wire, Electrical (Power, Fixed Installation) 2008a (Validated 2019).
- H. NEC 210.4(B) - Multiwire Branch Circuits - Disconnection Means; National Electrical Code 2008.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- 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 2021.
- 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 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 01 30 00 - 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.
- C. 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.
- D. Field Quality Control Test Reports.
- E. Manufacturer's Installation 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.
- 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. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### **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.
- C. Metal-clad cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. For branch circuit wiring within a room or space when branch circuits originate from a conduit and wire system in that room or space.
    - b. Where concealed in hollow stud walls, above accessible ceilings and non-accessible ceilings, and under raised floors for branch circuits up to 20 A.
  - 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 view, except in dedicated electrical, communications, and mechanical rooms where not subject to damage.
    - c. Where exposed to damage.
    - d. In walls with insulation.
    - e. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

## 2.02 CONDUCTOR AND CABLE MANUFACTURERS

- A. Cerro Wire LLC: [www.cerrowire.com](http://www.cerrowire.com).
- B. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
- C. American Insulated Wire: [www.leviton.com](http://www.leviton.com).
- D. Southwire Company: [www.southwire.com](http://www.southwire.com).
- E. General Cable: [www.generalcable.com](http://www.generalcable.com).
- F. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.03 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. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Comply with FS A-A-59544 where applicable.
- G. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- H. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- I. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
- J. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.
- K. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.
- L. 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.
- M. 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, only for the following:
      - 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.
  - 3) Provide copper equipment grounding conductor sized according to NFPA 70.
  - 4) Equip electrical distribution equipment with compression lugs for terminating 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.
- N. 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.
      - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
  2. Control Circuits: 14 AWG.
- O. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- P. 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.
    - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
  3. Color Code:
    - a. 208Y/120 V, 3 Phase, 4 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
      - 4) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.
    - c. For control circuits, comply with manufacturer's recommended color code.

## **2.04 SINGLE CONDUCTOR BUILDING WIRE**

- A. Manufacturers:

1. Copper Building Wire:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
    - b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
    - c. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Aluminum Building Wire (only where specifically indicated or permitted for substitution):
    - a. Alcan Products Corporation/Alcan Cable: [www.cable,alcan.com](http://www.cable,alcan.com).
    - b. Prysmian Power Cables and Systems: [www.us.prysmian.com](http://www.us.prysmian.com).
    - c. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid or stranded.
    - b. Size 8 AWG and Larger: Stranded.
  2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
    - a. Size 4 AWG and Larger: Type XHHW-2, THHN/THWN, or THHN/THWN-2.
    - b. Installed Underground: Type XHHW-2, THHN/THWN, or THHN/THWN-2.
  2. Aluminum Building Wire (only where specifically indicated or permitted for substitution):  
Type XHHW-2 or RHH/RHW-2

## 2.05 METAL-CLAD CABLE

- A. Manufacturers:
1. AFC Cable Systems Inc: [www.afcweb.com/#sle](http://www.afcweb.com/#sle).
  2. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
  3. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
  4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. 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.
- C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid or stranded.
  2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN/THWN or THHN/THWN-2.

- F. Provide dedicated neutral conductor for each phase conductor where indicated or required.
- G. Grounding: Full-size integral equipment grounding conductor.
- H. Armor: Steel, interlocked tape.
- I. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

## 2.06 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 26 05 26.
- C. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors or compression connectors.
  - 2. Copper Conductors Size 6 AWG and Larger: Use 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. 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.
  - 3. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
  - 4. Copper Conductors Size 8 AWG and Larger: Use compression connectors for all connections.
  - 5. Aluminum Conductors: Use compression connectors for all connections.
  - 6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
  - 7. Conductors for Control Circuits: Use crimped terminals where connectors are required.
- 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.
  - 1. Manufacturers:
    - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).

- b. Ideal Industries, Inc: [www.idealindustries.com/#sle](http://www.idealindustries.com/#sle).
  - c. NSI Industries LLC: [www.nsiindustries.com/#sle](http://www.nsiindustries.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
- 1. Manufacturers:
    - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. IlSCO: [www.ilsco.com/#sle](http://www.ilsco.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- 1. Manufacturers:
    - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. IlSCO: [www.ilsco.com/#sle](http://www.ilsco.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
- 1. Manufacturers:
    - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. IlSCO: [www.ilsco.com/#sle](http://www.ilsco.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.07 ACCESSORIES

- A. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- 1. Manufacturers:
    - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. Ideal Industries, Inc: [www.idealindustries.com/#sle](http://www.idealindustries.com/#sle).
    - c. IlSCO: [www.ilsco.com/#sle](http://www.ilsco.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Wire Pulling Lubricant:
- 1. Manufacturers:
    - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).
    - b. American Polywater Corporation: [www.polywater.com/#sle](http://www.polywater.com/#sle).
    - c. Ideal Industries, Inc: [www.idealindustries.com/#sle](http://www.idealindustries.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

2. Listed and labeled as complying with UL 267.
3. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
4. Suitable for use at installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

## **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 that originate in the same panelboard are shown as separate, combining them together in a single raceway is permitted, under the following conditions:
    - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
    - b. Increase size of conductors as required to account for ampacity derating.
    - c. Size raceways, boxes, etc. to accommodate conductors.
  8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each



individual branch circuit.

- 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. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- I. 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.
- J. Terminate cables using suitable fittings.
  - 1. Metal-Clad Cable (Type MC):
    - a. Use listed fittings.
    - b. Use steel or malleable iron. Do not use die-cast zinc.
    - c. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- K. Install conductors with a minimum of 6 inches of slack at each outlet.
- L. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

- 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.
  - 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 contaminants. 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.
    - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical 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. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- S. Identify conductors and cables in accordance with Section 26 05 53.
- T. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- U. 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.
- V. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1. Contractor shall comply with NEC 210.4(B) by providing a separate neutral conductor for each circuit in a multi-wire branch circuit.
- W. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels. Do not attach cables to slack wires. Plastic cable ties shall be plenum rated in plenum spaces.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - 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 services and feeders.
  - 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**

**SECTION 26 05 26**  
**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.
- F. Ground access wells.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Electrical Materials and Methods.
- B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
  - 1. Includes oxide inhibiting compound.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 51 00 - Lighting.
- E. Section 33 79 00 - Site Grounding.

**1.03 REFERENCE STANDARDS**

- A. BICSI TDMM - Telecommunications Distribution Methods Manual, 14th Edition 2020.
- B. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2022.
- E. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. TIA-607 - Commercial Building Grounding and Bonding Requirements for Telecommunications 2013.
- H. 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 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Field quality control test reports.
- E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

#### **1.07 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 25 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. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in

- NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
- a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
  - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
  - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
7. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.
- 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.
  2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame, nearest effectively grounded metal water pipe, or common grounding electrode conductor ground riser. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure or neutral (grounded) bus in first disconnecting means.
  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. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
  5. 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.
6. 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.
  7. 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 interior metal air ducts.
  9. Provide bonding for metal building frame.
  10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
  11. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.
  12. Provide redundant grounding and bonding for patient care areas of health care facilities in accordance with NFPA 70 and NFPA 99.



- 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 from intersystem bonding termination or building grounding electrode system to each communications room or backboard and provide ground bar for termination.
    - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
    - b. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
    - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
  3. Telecommunications Grounding System:
    - a. Install in accordance with BICSI TDMM, TIA/EIA 607, and NFPA 70.
    - b. Install grounding and bonding conductors concealed from view as much as possible.
    - c. Install grounding for each rack and equipment using #6 AWGTHHN, rated for 90 degrees C, insulated, copper stranded conductor to copper communication grounding bus bar.
    - d. Install routing for grounding conductor as short and direct as practical.
    - e. Install routing of bonding conductors with minimum number of bends and no splices. Use sweeping bends.
    - f. Install bonding connections with listed bolts, clamps, or lugs. Exothermic welding may be used.
    - g. Between each communications room, install multiple busbars directly bonded with #6 AWG copper conductor.
    - h. Ground data cabinets, racks, cable trays, and mounting hardware located in all telecommunications rooms.
    - i. Install ground from each piece of equipment to grounding bar via an insulated cable no smaller than #6 AWG stranded copper wire. Install proper grounding lug on cable where connecting to racks and grounding bar.
    - j. Label grounding conductors and grounding bus bars in accordance with BICSI guidelines.

## 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 26 05 26:
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.
    - a. Exceptions:
      - 1) Use mechanical connectors for connections to electrodes at ground access wells.
  3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
    - a. Exceptions:
      - 1) Use exothermic welded connections for connections to metal building frame.
  4. Manufacturers - Mechanical and Compression Connectors:
    - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. Harger Lightning & Grounding: [www.harger.com/#sle](http://www.harger.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
  5. Manufacturers - Exothermic Welded Connections:
    - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. Cadweld, a brand of Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: [www.thermoweld.com/#sle](http://www.thermoweld.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Ground Bars:
  1. Description: Copper rectangular ground bars with mounting brackets and insulators.
  2. Size: As specified herein.
  3. Holes for Connections: As indicated or as required for connections to be made.
  4. Manufacturers:
    - a. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - b. Harger Lightning & Grounding: [www.harger.com/#sle](http://www.harger.com/#sle).
    - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: [www.thermoweld.com/#sle](http://www.thermoweld.com/#sle).

- d. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Ground Rod Electrodes:
  1. Comply with NEMA GR 1.
  2. Material: Copper-bonded (copper-clad) steel.
  3. Size: 5/8 inch diameter by 10 feet length, unless otherwise indicated.
  4. Where rod lengths of greater than 10 feet are indicated or otherwise required, sectionalized ground rods may be used.
  5. Manufacturers:
    - a. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - b. Galvan Industries, Inc: [www.galvanelectrical.com/#sle](http://www.galvanelectrical.com/#sle).
    - c. Harger Lightning & Grounding: [www.harger.com/#sle](http://www.harger.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Ground Access Wells:
  1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
    - a. Areas Exposed to Vehicular Traffic: Rated for traffic.
  2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
    - a. Round Wells: Not less than 8 inches in diameter.
    - b. Rectangular Wells: Not less than 12 by 12 inches.
  3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches.
  4. Cover: Factory-identified by permanent means with word "GROUND".
  5. Manufacturers:
    - a. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - b. Harger Lightning & Grounding: [www.harger.com/#sle](http://www.harger.com/#sle).
    - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC:  
[www.thermoweld.com/#sle](http://www.thermoweld.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Oxide Inhibiting Compound: Comply with Section 26 05 19.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Remove paint, rust, mill oils, and surface contaminants at connection points.

### **3.02 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.

### **3.03 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.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform inspection, testing, and adjusting in accordance with Section 01 40 00.
- C. Inspect and test in accordance with NETA ATS except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.13.
- E. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- F. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- G. Submit detailed reports indicating inspection and testing results and corrective actions taken.

**END OF SECTION**

## SECTION 26 05 29

### 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 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 05 50 00 - Metal Fabrications: Materials and requirements for fabricated metal supports.
- C. Section 26 00 01 - Basic Materials and Methods
- D. Section 26 05 34 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- E. Section 26 05 37 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- F. Section 26 51 00 - Lighting: Additional support and attachment requirements for interior luminaires.

##### 1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- 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. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2018, with Editorial Revision (2020).
- E. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry 2018, with Editorial Revision (2020).
- F. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2017, with Editorial Revision (2020).
- G. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2023.
- H. MFMA-4 - Metal Framing Standards Publication 2004.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. 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 with other trades 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 installed under other sections or by others.
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 03 30 00.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
- D. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.
- E. Product Data: Provide manufacturer's catalog data for fastening systems.
- F. 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.

#### **1.06 QUALITY ASSURANCE**

- A. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Maintain at project site one copy of each referenced document that prescribes execution requirements.

## **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 by Underwriter's Laboratories Inc. (UL) or Interelec (ETL) 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 5. 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 unless otherwise indicated.
  - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel or stainless steel 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. Materials for Metal Fabricated Supports: See Section 05 50 00.**

#### **C. Conduit and Cable Supports: Straps, clamps, etc. suitable for the 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.
3. Manufacturers:
  - a. Cooper Crouse-Hinds, a division of Eaton Corporation:  
[www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
  - b. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
  - c. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).

- d. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
  - e. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
1. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation:  
[www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - c. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - d. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Metal Channel/Strut Framing Systems:
1. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation[<>]:  
[www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Thomas & Betts Corporation[<>]: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - c. Unistrut, Atkore International Inc; Unistrut: [www.unistrut.us/#sle](http://www.unistrut.us/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
  3. Comply with MFMA-4.
  4. Channel/Strut Used as Raceway, Where Indicated: Listed and labeled as complying with UL 5B.
  5. Channel Material:
    - a. Indoor Dry Locations: Use zinc-plated steel or galvanized steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel or stainless steel.
  6. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
  7. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.
- F. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    - a. Equipment Supports: 1/2-inch diameter.
    - b. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch diameter.
    - c. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch diameter.
    - d. Trapeze Support for Multiple Conduits: 3/8-inch diameter.
    - e. Outlet Boxes: 1/4-inch diameter.
    - f. Luminaires: 1/4-inch diameter.
- G. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers:



- a. Cooper B-Line, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).
  - b. Atkore International Inc; Unistrut: [www.unistrut.us/#sle](http://www.unistrut.us/#sle).
  - c. PHP Systems/Design: [www.phpsd.com/#sle](http://www.phpsd.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Description: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring attachment to roof structure and not penetrating roofing assembly, with support fixtures as specified.
  3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
  4. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
  5. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
  6. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- H. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
    - a. Hilti, Inc: [www.hilti.com/#sle](http://www.hilti.com/#sle).
    - b. Power Fasteners, Inc: [www.powers.com](http://www.powers.com).
    - c. ITW Red Head, a division of Illinois Tool Works, Inc: [www.itwredhead.com/#sle](http://www.itwredhead.com/#sle).
    - d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Manufacturers - Powder-Actuated Fastening Systems:
    - a. Hilti, Inc: [www.hilti.com/#sle](http://www.hilti.com/#sle).
    - b. Power Fasteners, Inc: [www.powers.com](http://www.powers.com).
    - c. ITW Ramset, a division of Illinois Tool Works, Inc: [www.ramset.com/#sle](http://www.ramset.com/#sle).
    - d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
  3. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
  4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
  5. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
  6. Hollow Masonry: Use toggle bolts.
  7. Hollow Stud Walls: Use toggle bolts.
  8. Steel: Use beam clamps, machine bolts, or welded threaded studs.
  9. Sheet Metal: Use sheet metal screws.
  10. Wood: Use wood screws.

11. Plastic and lead anchors are not permitted.
12. Powder-actuated fasteners are permitted only as follows:
  - a. Where approved by Architect.
  - b. Use only threaded studs; do not use pins.
13. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
  - a. Manufacturer: Same as manufacturer of metal channel/strut framing system.
  - b. Comply with MFMA-4.
  - c. Channel Material: Use galvanized steel.
  - d. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
14. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

## 2.02 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or framed steel members; galvanized.
- C. Anchors and Fasteners:
  1. Obtain permission from Architect before using powder-actuated anchors.
  2. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
  3. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
  4. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
  5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
  6. Solid Masonry Walls: Use expansion anchors or preset inserts.
  7. Sheet Metal: Use sheet metal screws.
  8. Wood Elements: Use wood screws.
- D. Fastener Types:
  1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
- E. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
  1. Other Types: As required.
  2. Manufacturers:
    - a. Powers Fasteners, Inc.: [www.powers.com](http://www.powers.com).

- b. Substitutions: See Section 01 60 00 - Product Requirements.
- c. Substitutions:
- 3. Formed Steel Channel:
  - a. Manufacturer: Kindorf, Unistrut, B-Line, or approved.
  - b. Substitutions: See Section 01 60 00 - Product Requirements.
- 4. Steel Spring Clips:
  - a. Manufacturer: Caddy, Raco, T&B, B-Line.
  - b. Substitutions: See Section 01 60 00 - Product Requirements.

### **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 as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
  - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
  - 2. Obtain permission from Architect before drilling or cutting structural members.
- C. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- D. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- E. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- F. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- G. Perform work in accordance with NECA 1 (general workmanship).
- H. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- I. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- J. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- K. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- L. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

- M. Field Welding, Where Approved by Architect: See Section 05 50 00.
- N. 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 03 30 00.
  - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- O. Conduit Support and Attachment: See Section 26 05 34 for additional requirements.
- P. Box Support and Attachment: See Section 26 05 37 for additional requirements.
- Q. Interior Luminaire Support and Attachment: See Section 26 51 00 for additional requirements.
- R. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- S. Secure fasteners in accordance with manufacturer's recommended torque settings.
- T. Remove temporary supports.
- U. Identify independent electrical component support wires above accessible ceilings, where permitted, with color distinguishable from ceiling support wires in accordance with NFPA 70.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - 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**

**SECTION 26 05 34**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Galvanized steel intermediate metal conduit (IMC).
- D. PVC-coated galvanized steel rigid metal conduit (RMC).
- E. Flexible metal conduit (FMC).
- F. Liquidtight flexible metal conduit (LFMC).
- G. Galvanized steel electrical metallic tubing (EMT).
- H. Rigid polyvinyl chloride (PVC) conduit.
- I. Reinforced thermosetting resin conduit (RTRC).

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete encasement of conduits.
- B. Section 07 84 00 - Firestopping.
- C. Section 26 00 01 - Basic Materials and Methods.
- D. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Cable assemblies consisting of conductors protected by integral metal armor.
- E. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
  - 1. Includes additional requirements for fittings for grounding and bonding.
- F. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- G. Section 26 05 37 - Boxes for Electrical Systems.
- H. Section 26 05 35 - Surface Raceways for Electrical Systems.
- I. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- J. Section 27 05 28 - Pathways for low Voltage Systems Cabling: Additional requirements for communications systems conduits.
- K. Section 31 23 16 - Excavation.
- L. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.
- M. Section 31 23 23 - Fill: Bedding and backfilling.

**1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A) 2020.

- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- G. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit 2004.
- H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- I. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- J. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- K. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- L. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series 2015.
- M. NEMA TC 14.AG - Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings 2015 (Reaffirmed 2021).
- N. NEMA TC 14.BG - Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings 2015 (Reaffirmed 2020).
- O. NEMA TC 14.XW - Extra Heavy Wall Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings 2015 (Reaffirmed 2021).
- P. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- Q. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- R. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- S. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel Current Edition, Including All Revisions.
- T. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- U. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.
- V. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- W. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- X. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- Y. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations Current Edition, Including All Revisions.
- Z. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.
- AA. 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 installed under other sections or by other.
  3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed in other sections or by others.
  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.
  2. For projects with Post Tension (PT) slab construction, submit dimensioned plan showing all conduit sleeves & block out locations to Architect for review.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Shop Drawings:
  1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.
  2. Include proposed locations of roof penetrations and proposed methods for sealing.
- D. 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.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Documents at Project Site: Maintain at project site one copy of manufacturer's instructions, shop drawings, and reference standard documents containing execution requirements.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

## **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 galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
  - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
  - 3. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) where emerging from underground.
  - 4. Where rigid polyvinyl (PVC) conduit larger than 2-inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows, galvanized steel intermediate metal conduit (IMC) elbows, or fiberglass for bends in runs over 100 feet. For shorter runs, factory formed Schedule 40 PVC may be used.
  - 5. 1.5 Inches Diameter and Smaller: For total conduit lengths between pull points over 100 ft., use rigid steel elbows. For shorter overall lengths, rigid steel or Schedule 40 PVC may be used.
  - 6. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth where soil has resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, 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.
- D. Embedded Within Concrete:
  - 1. Within Slab on Grade (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).



2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
  3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
  4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) where emerging from concrete.
  5. Where galvanized steel electrical metallic tubing (EMT) emerges from concrete into salt air, use corrosion protection tape acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches on either side of where conduit emerges, or use PVC-coated galvanized steel rigid metal conduit.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC).
- I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
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 and manufacturing areas.
- K. Exposed, Exterior: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit (RMC).
- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
- M. Corrosive Locations Above Ground: Use aluminum rigid metal conduit (RMC), PVC-coated galvanized steel rigid metal conduit (RMC), or reinforced thermosetting resin conduit (RTRC).

1. Corrosive locations include, but are not limited to:
  - a. Cooling towers.
  - b. Swimming pools and associated equipment areas.
- N. Hazardous/Classified Locations: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
- 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) or MC cable.

## 2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Electrical Service Conduits.
- C. Communications Systems Conduits: Also comply with Section 27 10 00 or 271343.
- D. Fittings for Grounding and Bonding: See Section 26 05 26 for additional requirements.
- E. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- F. Provide products listed, classified, and labeled as suitable for purpose intended.
- G. Minimum Conduit Size, Unless Otherwise Indicated:
  1. Branch Circuits: 1/2-inch trade size.
  2. Branch Circuit Homeruns: 3/4-inch trade size.
  3. Control Circuits: 1/2-inch trade size.
  4. Flexible Connections to Luminaires: 1/2-inch trade size.
  5. Underground, Interior: 3/4-inch trade size.
  6. Underground, Exterior: 3/4-inch trade size.
- H. 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. Manufacturers:
  1. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  2. Republic Conduit: [www.republic-conduit.com](http://www.republic-conduit.com).

3. Wheatland Tube, a division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
  1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. Emerson Electric Co; O-Z/Gedney: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
  3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
  4. Material: Use steel or malleable iron.
    - a. Do not use die cast zinc fittings.
  5. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

#### **2.04 ALUMINUM RIGID METAL CONDUIT (RMC)**

- A. Manufacturers:
  1. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  2. Nucor Tubular Products: [www.nucortubular.com/#sle](http://www.nucortubular.com/#sle).
  3. Western Tube, a division of Zekelman Industries: [www.westerntube.com/#sle](http://www.westerntube.com/#sle).
  4. Wheatland Tube, a division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
- B. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- C. Fittings:
  1. Manufacturers:
    - a. ABB; T&B: [www.electrification.us.abb.com/#sle](http://www.electrification.us.abb.com/#sle).
    - b. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.us/#sle](http://www.alliedeg.us/#sle).
    - c. Bridgeport Fittings, LLC: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - d. Emerson Electric Co; O-Z/Gedney: [www.emerson.com/#sle](http://www.emerson.com/#sle).
  2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A
  3. Material: Use aluminum.
  4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

## **2.05 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)**

- A. Manufacturers:
  - 1. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  - 2. Republic Conduit: [www.republic-conduit.com](http://www.republic-conduit.com).
  - 3. Wheatland Tube, a division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings, LLC: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. Emerson Electric Co; O-Z/Gedney: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  - 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
  - 3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
  - 4. Material: Use steel or malleable iron.
    - a. Do not use die cast zinc fittings.
  - 5. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

## **2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Manufacturers:
  - 1. ABB; Ocal: [www.electrification.us.abb.com/#sle](http://www.electrification.us.abb.com/#sle).
  - 2. Calbond, a division of Atkore International [www.calbond.com/#sle](http://www.calbond.com/#sle)
  - 3. Robroy Industries: [www.robroy.com/#sle](http://www.robroy.com/#sle).
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.
- D. PVC-Coated Boxes and Fittings:
  - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
  - 2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
  - 3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
  - 4. Material: Use steel or malleable iron.

5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.
- E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

## **2.07 FLEXIBLE METAL CONDUIT (FMC)**

- A. Manufacturers:
1. AFC Cable Systems, a division of Atkore International: [www.afcweb.com/#sle](http://www.afcweb.com/#sle).
  2. Electri-Flex Company: [www.electriflex.com/#sle](http://www.electriflex.com/#sle).
  3. International Metal Hose: [www.metalhose.com/#sle](http://www.metalhose.com/#sle).
- B. Description: NFPA 70, Type FMC standard-wall steel or standard-wall aluminum flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- C. Fittings:
1. Manufacturers:
    - a. Bridgeport Fittings, LLC: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. Emerson Electric Co; O-Z/Gedney: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel, malleable iron, or aluminum.
    - a. Do not use die cast zinc fittings.

## **2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)**

- A. Manufacturers:
1. AFC Cable Systems, a division of Atkore International: [www.afcweb.com/#sle](http://www.afcweb.com/#sle).
  2. Electri-Flex Company: [www.electriflex.com/#sle](http://www.electriflex.com/#sle).
  3. International Metal Hose: [www.metalhose.com/#sle](http://www.metalhose.com/#sle).
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel or aluminum flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
1. Manufacturers:
    - a. Bridgeport Fittings, LLC: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. Emerson Electric Co; O-Z/Gedney: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel, malleable iron, or aluminum.
    - a. Do not use die cast zinc fittings.

## **2.09 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)**

- A. Manufacturers:
  - 1. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  - 2. Republic Conduit: [www.republic-conduit.com](http://www.republic-conduit.com).
  - 3. Wheatland Tube, a division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
- B. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings, LLC: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. Emerson Electric Co; O-Z/Gedney: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel.
  - 4. Connectors and Couplings: Use set-screw except when embedded in concrete. Use concrete right compression (gland) type in concrete.
    - a. Do not use indenter type connectors and couplings.

## **2.10 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT**

- A. Manufacturers:
  - 1. ABB; Carlon: [www.carlon.com/#sle](http://www.carlon.com/#sle).
  - 2. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  - 3. Cantex Inc: [www.cantexinc.com/#sle](http://www.cantexinc.com/#sle).
  - 4. JM Eagle: [www.jmeagle.com/#sle](http://www.jmeagle.com/#sle).
- B. 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.
- C. 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.
- D. Elbows:
  - 1. Use only factory formed Schedule 40 elbows. Field bends are not acceptable.
  - 2. 1.5 Inches Diameter and Smaller: For total conduit lengths between pull points over 100 ft., use rigid steel elbows. For shorter overall lengths, rigid steel or Schedule 40 PVC may

be used.

3. 2 Inches Diameter and Larger: For total conduit lengths between pull points over 100 ft., use long sweep rigid steel or fiberglass elbows. For shorter overall lengths, rigid steel, fiberglass, or Schedule 40 PVC elbows may be used.

## **2.11 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)**

### **A. Manufacturers:**

1. Champion Fiberglass, Inc: [www.championfiberglass.com/#sle](http://www.championfiberglass.com/#sle).
2. FRE Composites: [www.frecompositesinc.com/#sle](http://www.frecompositesinc.com/#sle).
3. United Fiberglass of America, Inc: [www.unitedfiberglass.com/#sle](http://www.unitedfiberglass.com/#sle).
4. Substitutions: See Section 01 60 00 - Product Requirements.

### **B. Applications:**

1. Above Ground, Not Subject to Physical Damage: Use aboveground (AG), SW (Standard Wall) RTRC.

### **C. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).**

1. Aboveground (AG) RTRC: Comply with NEMA TC 14.AG and list and label as complying with UL 2515.
2. Aboveground (AG), XW (Extra Heavy Wall) RTRC: Comply with NEMA TC 14.XW and list and label as complying with UL 2515A.
3. Belowground (BG) RTRC: Comply with NEMA TC 14.BG and list and label as complying with UL 2420.

### **D. Supports: As recommended by manufacturer.**

### **E. Fittings: Same type and manufacturer as conduit to be connected.**

## **2.12 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. Epoxy Adhesive for RTRC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.**

### **E. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.**

### **F. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.**

### **G. 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.

### **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.

#### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. 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 roofs.
    - c. Across top of parapet walls.
    - d. 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 12 inches between conduits and hot surfaces.
  13. Group parallel conduits in same area on common rack.
- I. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 05 29.
  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.
  11. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.
- J. 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.
- K. 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. Provide metal escutcheon plates for conduit penetrations exposed to public view.
  9. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 84 00.
- L. Underground Installation:
1. Provide trenching and backfilling; see Section 31 23 16 and Section 31 23 23.
  2. Minimum Cover, Unless Otherwise Indicated or Required:
    - a. Underground, Exterior: 24 inches.
    - b. Under Slab on Grade: 12 inches to bottom of slab.
  3. Provide underground warning tape along entire conduit length for service entrance where not concrete-encased; see Section 26 05 53.
- M. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
1. Include proposed conduit arrangement with submittals.
  2. Maximum Conduit Size: 1-inch trade size unless otherwise approved.
  3. Minimum Conduit Spacing: Shall be as directed by Structural Engineer.
  4. Install conduits within middle one third of slab thickness.

5. Secure conduits to prevent floating or movement during pouring of concrete.
- N. 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 03 30 00.
- O. 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 calculated in accordance with NFPA 70 for reinforced thermosetting resin conduit (RTRC) conduit installed above ground to compensate for thermal expansion and contraction.
  4. Where conduits are subject to earth movement by settlement or frost.
- P. Conduit Sealing:
  1. Use seal fitting or approved sealing compound 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 seal fitting or approved sealing compound 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.
    - c. Where conduits penetrate coolers or freezers.
  3. Where conduits cross boundaries of hazardous/classified locations, provide identified/listed sealing fittings located as indicated or in accordance with NFPA 70.
- Q. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- R. Do not cross conduits in slab.
- S. Cut conduit square using saw or pipecutter; de-burr cut ends.
- T. Bring conduit to shoulder of fittings; fasten securely.
- U. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

- V. All elbows installed in primary and secondary power conduit runs shall be minimum 36-inch radius.
- W. Where conduit is shown stubbed into a telephone, computer or communication terminal area, conduit shall be stubbed up 6 inches below ceiling and terminated with insulating bushings.
- X. Where the contractor elects to utilize PVC in lieu of GRC, the contractor shall provide supplemental ground bus in terminating switch and panelboards, and green ground wire as per code rules.
- Y. Conduit runs shall not exceed 100 feet without an accessible pull box installed in line.
- Z. Communications system conduit run above the ceiling shall not be installed within 12 inches of a parallel run of current carrying conductors, transformers, feeder cables, motors, or lighting ballasts.
- AA. Conduit connections between outlet boxes less than 24 inches apart on opposite sides of a wall shall be made with a loop of flexible conduit to limit sound transmission.
- BB. Penetrations of Masonry and Concrete Constructions:
  - 1. Ensure that the sound control performance of structures be maintained in accordance with the drawings and specifications. All penetrations shall be installed in a manner that results in complete air tightness through structure. If a condition occurs where penetration of the structure by a conduit is not shown clearly on the drawings (or described in the specifications), the Contractor shall ask immediately for clarification of the method necessary to install the particular item.
- CC. Penetrations of Drywall Constructions:
  - 1. Ensure that the sound control performance of structures be maintained in accordance with the drawings and specifications. All penetrations shall be installed in a manner that results in complete air tightness through structure. If a condition occurs where penetration of the structure by a conduit is not shown clearly on the drawings (or described in the specifications), the Contractor shall ask immediately for clarification of the method necessary to install the particular item.
- DD. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- EE. To attenuate objectionable EMI and RFI signals, the audio and video system raceway groups shall maintain a specified minimum distance separation whenever possible within the constraints of the building's architecture. System conduit groups that run parallel with each other shall adhere to the following table of minimum distance separation:

<u>Audio/Video Sub-System</u>	Microphone	Line	Speaker	Video
Microphone	Adjacent	6 inches	12 inches	12 inches
Line	6 inches	Adjacent	12 inches	6 inches
Speaker	12 inches	6 inches	Adjacent	6 inches
Video	12 inches	6 inches	6 inches	Adjacent

- FF. Audio and video system conduit that runs parallel with AC power conduit shall be separated by at least 3 feet minimum.
- GG. Audio and video system conduit that runs across or perpendicular to AC power conduit shall be separated by at least 1 foot minimum.
- HH. To attenuate objectionable EMI and RFI signals, the telecommunications system raceway and cable shall maintain a specified minimum distance separation whenever possible within the constraints of the building's architecture.

<u>Condition</u>	<u>Minimum Separation Distance</u>
Unshielded power lines or electrical equipment in proximity to open or nonmetal telecommunication pathways	24 inches
Unshielded power lines or electrical equipment in proximity to a grounded metal telecommunication conduit pathway	12 inches
Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal telecommunication conduit pathway	12 inches
Electrical motors, transformers, generators, frequency converters, and UPS systems	47 inches

### 3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- 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**

**SECTION 26 05 35**  
**SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wireways.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Materials and Methods.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 34 - Conduit for Electrical Systems.
- E. Section 26 05 37 - Boxes for Electrical Systems.
- F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of wireways with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Verify minimum sizes of wireways with the actual conductors and components to be installed.
  - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install wireways until final surface finishes and painting are complete.
  - 2. Do not begin installation of conductors and cables until installation of wireways is complete

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
- C. Shop Drawings:
  - 1. Wireways: Provide dimensioned plan and elevation views including adjacent equipment with all required clearances indicated.
- D. 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.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 RACEWAY REQUIREMENTS**

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc (UL) or Intertek (ETL) as suitable for the purpose intended.
- C. Do not use wireways for applications other than as permitted by NFPA 70 and product listing.

#### **2.02 WIREWAYS**

- A. Manufacturers:
  - 1. Cooper B-Line, a division of Cooper Industries: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
  - 2. Hoffman, a brand of Pentair Technical Products: [www.hoffmanonline.com/#sle](http://www.hoffmanonline.com/#sle).
  - 3. Schneider Electric; Square D Products: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
  - 4. Siemens: [www.usa.siemens.com](http://www.usa.siemens.com).
  - 5. GE: [www.ge.com](http://www.ge.com).
- B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.
- C. Wireway Type, Unless Otherwise Indicated:

1. Indoor Clean, Dry Locations: NEMA 250, Type 1, painted steel or Type 12, painted steel with screw cover, hinged cover, or secured with screws.
  2. Outdoor Locations: NEMA 250, Type 3R, painted steel with screw cover, hinged cover, or secured with screws.
- D. Finish for Painted Steel Wireways: Manufacturer's standard grey unless otherwise indicated.
- E. Minimum Wireway Size: 4 by 4 inches unless otherwise indicated.
- F. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

### **2.03 SOURCE QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive wireways and that final surface finishes are complete, including painting.
- 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. Install wireways plumb and level.
- D. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.
- E. Secure and support wireways in accordance with Section 26 05 29 at intervals complying with NFPA 70 and manufacturer's requirements.
- F. Close unused raceway openings.
- G. Provide grounding and bonding in accordance with Section 26 05 26.
- H. Identify wireways in accordance with Section 26 05 53.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect wireways for damage and defects.
- C. Correct wiring deficiencies and replace damaged or defective wireways.

### **3.04 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.



**3.05 PROTECTION**

- A. Protect installed wireways from subsequent construction operations.

**END OF SECTION**

**SECTION 26 05 37**  
**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. Floor boxes.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 07 84 00 - Firestopping.
- C. Section 08 31 00 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- D. Section 26 00 01 - Basic Materials and Methods.
- E. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- F. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- G. Section 26 05 34 - 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.
- H. Section 26 05 35 - Surface Raceways for Electrical Systems:
  - 1. Lay-in wireways and wiring troughs with removable covers.
- I. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- J. Section 26 27 26 - Wiring Devices:
  - 1. Wall plates.
  - 2. Floor box service fittings.
  - 3. Additional requirements for locating boxes for wiring devices.
- K. Section 27 05 28 - Pathways for Low Voltage Systems Cabling: Additional requirements for communications systems outlet boxes.
- L. Section 27 10 00 - Structured Cabling: Additional requirements for communications systems outlet boxes.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- 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. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- J. 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 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Installation 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.

- C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, and floor boxes.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Keys for Lockable Enclosures: Two of each different key.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Provide products listed with Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- C. Electrical boxes shall be sized accordingl to NEC requirements unless otherwise noted in contract documents.
- D. Maintain integrity of insulation materials where flush boxes are installed in insulated spaces.
- E. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

#### **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 or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
  - 4. Use cast aluminum boxes where aluminum rigid metal conduit is used.

5. Use suitable concrete type boxes where flush-mounted in concrete.
6. Use suitable masonry type boxes where flush-mounted in masonry walls.
7. Use raised covers suitable for the type of wall construction and device configuration where required.
8. Use shallow boxes where required by the type of wall construction.
9. Do not use "through-wall" boxes designed for access from both sides of wall.
10. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
11. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
12. 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.
13. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
14. Minimum Box Size, Unless Otherwise Indicated:
  - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
  - b. Communications Systems Outlets: Comply with Section 27 10 00.
  - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
15. Wall Plates: Comply with Section 26 27 26.
16. Manufacturers:
  - a. Cooper Crouse-Hinds, a division of Eaton Corporation:  
[www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
  - b. Hubbell Incorporated; Bell Products: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
  - c. Hubbell Incorporated; RACO Products: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
  - d. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
  - e. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
  - f. Appleton Electric: [www.emerson.com/en-us/automation/appleton](http://www.emerson.com/en-us/automation/appleton).
  - g. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
  1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    - a. Indoor Clean, Dry Locations: Type 1, painted steel.
    - b. Outdoor Locations: Type 3R, painted steel.
  3. Junction and Pull Boxes Larger Than 100 cubic inches:

- a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
  - b. Boxes 6 square feet and Larger: Provide hinged-cover enclosures.
  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(where applicable).
  5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
  6. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Hoffman, a brand of Pentair Technical Products: [www.hoffmanonline.com/#sle](http://www.hoffmanonline.com/#sle).
    - c. Hubbell Incorporated; Wiegmann Products: [www.hubbell-wiegmann.com/#sle](http://www.hubbell-wiegmann.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Electrical Outlet Box Pad:
1. Electrical outlet box pads shall be applied where called out on the drawings or specifications. Its function is to seal box openings, increase mass, and provide damping to reduce air-transmitted sound through party walls. It shall consist of polybutene-butyl and inert fillers. Material shall provide good adhesion to metal and plastic. Pads shall be applied to the backs of installed electrical boxes, molded to box, and folded around conduit cable entering the box. Pads shall not be used in areas subject to temperatures above 200 degrees F.
  2. The following are acceptable, subject to the above:
    - a. Lowry's outlet box pads from Harry A. Lowry & Associates, Inc., Sun Valley, California, (800) 225-8231.
    - b. SpecSeal firestop putty pads (fire-rated) from Specified Technologies, Incorporated, Somerville, New Jersey, (800) 992-1180.
    - c. Or approved equal.
  3. In-Ground Cast Metal Box: NEMA 250, Type 6, flanged, recessed cover box for flush mounting.

## **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. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
  - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
    - a. Coordinate exact box location of in-floor boxes with Architect.
    - b. Adjust box locations up to 10 feet if required to accommodate intended purpose, at no additional cost to Owner.
  - 2. Locate boxes as required for devices installed under other sections or by others.
    - a. Switches, Receptacles, and Other Wiring Devices: Comply as indicated on drawings .
    - b. Communications Systems Outlets: Comply as indicated on drawings.
  - 3. Locate boxes so that wall plates do not span different building finishes.
  - 4. Locate boxes so that wall plates do not cross masonry joints.
  - 5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
  - 6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 24 inches horizontal separation unless otherwise indicated.
  - 7. 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.
  - 8. 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 26 05 34.
  - 9. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:

- a. Concealed above accessible suspended ceilings.
  - b. Within joists in areas with no ceiling.
  - c. Electrical rooms.
  - d. Mechanical equipment rooms.
- I. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 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.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
  4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- J. Install boxes plumb and level.
- K. 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.
- L. Floor-Mounted Cabinets: Mount on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
- M. Install boxes as required to preserve insulation integrity.
- N. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
- O. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- Q. Close unused box openings.
- R. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- S. Provide grounding and bonding in accordance with Section 26 05 26.



- T. Identify boxes in accordance with Section 26 05 53.
  - 1. Adjust box locations up to 10 feet if required to accommodate intended purpose, at no additional cost to Owner.
- U. Orient boxes to accommodate wiring device orientation as specified in Section 26 27 26.
- V. Maintain headroom and present neat mechanical appearance.
- W. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- X. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- Y. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- Z. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- AA. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
  - 1. Acoustic rated walls.
    - a. In a single stud wall, there shall be a separation of 24 inches between centerlines of outlet boxes or receptacles set into opposite sides of the wall. When these boxes are of dimensions exceeding 4 inches wide, this dimension (24 inches) shall be clear between the side walls, providing a full 24-inch separation regardless of the box size. Conduit connecting such boxes shall be flexible and shall provide 6 inches slack per 24 inches of run.
    - b. In a double stud wall, boxes in opposite sides of the wall shall be located 24 inches on center, minimum. Effectively, this means that boxes on the same side of the wall will be 48 inches apart if there is a box between them on the other side of the wall. Conduit, in the case of a double wall, shall home run to a point outside of the partition before connecting to cable and conduit connecting boxes on the other side. Conduit, which shall be flexible, may thread through the studs on its own side but shall under no circumstances interface with the stud on the other side of the wall.
    - c. The boxes shall be treated to reduce sound transmission. All unused knock-out holes shall be plugged with knock-out caps. The openings or cutouts in the walls to receive the boxes/receptacles shall be made no more than 1-1/4 inches oversize to allow a gap all around of 1-1/8 inches. The flanges shall be perimeter sealed with acoustical caulking, prior to the boxes/receptacles being inserted.
    - d. An outlet box pad, which acts to increase mass and provides damping, shall be applied to the backs of back-to-back electrical boxes separated by less than 24 inches, or where the box is installed in acoustical barrier walls. Refer to architectural wall types.
- BB. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- CC. Use adjustable steel channel fasteners for hung ceiling outlet box.

DD. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.

EE. Locate outlet boxes so that the wall plates do not cross masonry joints or span different building finishes.

### **3.03 CLEANING**

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.
- B. Clean exposed surfaces and restore finishes.

### **3.04 PROTECTION**

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

### **3.05 INTERFACE WITH OTHER PRODUCTS**

### **3.06 COORDINATE INSTALLATION OF OUTLET BOX WITH PRODUCTS FURNISHED UNDER OTHER SECTIONS OF THESE SPECIFICATIONS.**

- A. Coordinate locations and sizes of required access doors.
- B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- C. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes with architectural drawings.

**END OF SECTION**

**SECTION 26 05 53**  
**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. Underground warning tape.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 91 13 - Exterior Painting.
- B. Section 09 91 23 - Interior Painting.
- C. Section 26 00 01 - Basic Materials and Methods.
- D. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- E. Section 26 27 26 - Wiring Devices: Device and wallplate finishes; factory pre-marked wallplates.
- F. Section 27 05 28 - Pathways for Low Voltage Systems Cabling: Additional requirements for communications systems outlet boxes.
- G. Section 27 10 00 - Structured Cabling: Identification for communications cabling and devices.

**1.03 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 70E - Standard for Electrical Safety in the Workplace 2024.
- 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 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

## 1.06 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. Switchboards:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify power source.
      - 4) Use identification nameplate to identify main overcurrent protective device.
      - 5) Use identification nameplate to identify load(s) served for each branch device.  
Do not identify spares and spaces.
      - 6) Available 3 phase fault current.
    - b. Panelboards:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify power source.
      - 4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
      - 5) Use computer generated circuit directory and identify load(s) served for panelboards with a door. Identify spares and spaces. Identify load type, circuit number, breaker size and number of poles, and circuit load in volt-amps.
      - 6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
    - c. Relay Control Panels:
      - 1) Identify voltage and phase.
      - 2) Identify power source.
      - 3) Provide computer generated circuit directory to identify load(s) served. Identify spares and spaces. Identify load relay number, panelboard circuit number that serves each relay.
    - d. Transformers:
      - 1) Identify kVA rating.

- 2) Identify voltage and phase for primary and secondary.
- 3) Identify power source.
- 4) Identify load(s) served.
- e. Enclosed switches, circuit breakers, and motor controllers:
  - 1) Identify voltage and phase.
  - 2) Identify power source and circuit number.
  - 3) Identify load(s) served.
- f. Time Switches:
  - 1) Identify load(s) served and associated circuits controlled. Include location.
- g. Enclosed Contactors:
  - 1) Identify voltage and phase.
  - 2) Identify configuration, e.g., E.O.E.H. (electrically operated, electrically held) or E.O.M.H. (electrically operated, mechanically held).
  - 3) Identify coil voltage.
  - 4) Identify load(s) and associated circuits controlled. Include location.
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.
  - c. Use identification nameplate or identification label at each piece of service equipment to identify available fault current and the date calculations were performed.
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 identification nameplate to identify disconnect location for equipment with remote disconnecting means.
5. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
6. 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.
  7. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
    - a. Minimum Size: 5 by 7 inches.
    - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
- B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.  
Less than 250 Volts Between Phases  
Phase A - Black  
Phase B - Red  
Phase C - Blue  
Neutral - White  
Ground - Green
  2. Identification for Communications Conductors and Cables: Comply with Section 27 13 43.
  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.
  4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
  5. Use underground warning tape to identify direct buried cables.
- C. Identification for Raceways:
1. Use underground warning tape to identify underground raceways.
- D. Identification for Boxes:
1. Use voltage markers or color coded boxes to identify specified systems.
    - a. Color-Coded Boxes: Field-painted in accordance with Section 09 91 23 and 09 91 13 per the following color code:
      - 1) Fire Alarm System: Red.
    - b. For exposed boxes in public areas, do not color code.

2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
  - a. For exposed boxes in public areas, provide identification on inside face of cover.

## **2.02 IDENTIFICATION NAMEPLATES AND LABELS**

### **A. Identification Nameplates:**

1. Manufacturers:
  - a. Brimar Industries, Inc: [www.brimar.com/#sle](http://www.brimar.com/#sle).
  - b. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  - c. Seton Identification Products: [www.seton.com/#sle](http://www.seton.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Materials:
  - a. Indoor Clean, Dry Locations: Use plastic nameplates.
  - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
3. Plastic Nameplates: Two-layer or three-layer laminated 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.
4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
6. 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. Manufacturers:
  - a. Brady Corporation: [www.bradyid.com/#sle](http://www.bradyid.com/#sle).
  - b. Brother International Corporation: [www.brother-usa.com/#sle](http://www.brother-usa.com/#sle).
  - c. Panduit Corp: [www.panduit.com/#sle](http://www.panduit.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

## **2.03 WIRE AND CABLE MARKERS**

### **A. Manufacturers:**

1. Brady Corporation: [www.bradyid.com/#sle](http://www.bradyid.com/#sle).
  2. HellermannTyton: [www.hellermanntyton.com/#sle](http://www.hellermanntyton.com/#sle).
  3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Markers for Conductors and Cables:
1. 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.
- C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- D. Legend: Power source and circuit number or other designation indicated.
- E. Text: Use factory pre-printed or machine-printed text, all capitalized. Do not use hand written text.
- F. Minimum Text Height: 1/8 inch.
- G. Color: Black text on white background unless otherwise indicated.

## **2.04 UNDERGROUND WARNING TAPE**

- A. Manufacturers:
1. Brady Corporation: [www.bradyid.com/#sle](http://www.bradyid.com/#sle).
  2. Brimar Industries, Inc: [www.brimar.com/#sle](http://www.brimar.com/#sle).
  3. Seton Identification Products: [www.seton.com/#sle](http://www.seton.com/#sle).
  4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Materials: Use non-detectable or foil backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
1. Exception: Use foil-backed detectable type tape where required by serving utility or where directed by Owner.
- C. Non-detectable Type Tape: 3 inches wide, with minimum thickness of 4 mil.
- D. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.
- E. Legend: Type of service, continuously repeated over full length of tape.
- F. Color:
1. Tape for Buried Power Lines: Black text on red background.
  2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

## **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 or enclosure front.
  - 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, rivets, self-adhesive backing, or epoxy cement and to interior surfaces using self-adhesive backing or epoxy cement.
  - 1. Do not use adhesives on exterior surfaces except where substrate cannot be penetrated.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 6 inch(es) below finished grade. For trenches over 18 inches wide, install additional marker tape such that they are not over 10 inches apart (edge to edge) over the entire width of the trench.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - 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**

**SECTION 26 05 73**  
**POWER SYSTEM STUDIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.
- B. Performance requirements for overcurrent protective devices.
- C. Coordination study and analysis.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Materials and Methods.
- B. Section 26 24 13 - Switchboards.
- C. Section 26 24 16 - Panelboards.
- D. Section 26 28 13 - Fuses.
- E. Section 26 28 16.13 - Enclosed Circuit Breakers.

**1.03 REFERENCE STANDARDS**

- A. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems 2001, with Errata (2003).
- B. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis 1997.
- C. NEMA MG 1 - Motors and Generators 2021.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**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 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Study preparer's qualifications.
- C. Study reports, stamped or sealed and signed by study preparer.
- D. Study Report: Submit protective device studies as specified, prior to submission of product data submittals or ordering or fabrication of protective devices.
  - 1. Evaluation of product data submittals by Architect will not commence until acceptable studies have been submitted.
  - 2. Include stamp or seal and signature of preparing engineer
- E. Product Data: In addition to submittal requirements specified in other sections, include submit manufacturer's time-current curves for all protective devices.
  - 1. Identify modifications made in accordance with studies that:
    - a. Can be made at no additional cost to Owner.
    - b. As submitted will involve a change to the contract sum.
- F. Field Engineer Qualifications.
- G. Field quality control reports.
- H. Certification that field adjustable protective devices have been set in accordance with requirements of studies.
- I. Project Record Documents: Revise studies as required to reflect as-built conditions.
  - 1. Submit not less than 60 days prior to final inspection of electrical system.
  - 2. Include hard copies with operation and maintenance data submittals.
  - 3. 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 1 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. 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.

### **1.07 PROTECTIVE DEVICE STUDY**

- A. Analyze the specific electrical and utilization equipment (according to NEC definition), the actual protective devices to be used, and the actual feeder lengths to be installed.

1. Scope of Studies: All new and existing distribution wiring and equipment, from primary source to buses and branch circuit panelboards, associated with emergency and legally required standby systems per NEC 700.27 and NEC 701.27.
  2. Primary Source, for Purposes of Studies: Utility company primary protective devices.
  3. Study Methodology: Comply with requirements and recommendations of NFPA 70, IEEE 399, and IEEE 242.
  4. Report: State the methodology and rationale employed in making each type of calculation; identify computer software package(s) used.
- B. One-Line Diagrams: Prepare schematic drawing of electrical distribution system, with all electrical equipment and wiring to be protected by the protective devices; identify nodes on the diagrams for reference on report that includes:
1. Calculated fault impedance, X/R ratios, utility contribution, and short circuit values (asymmetric and symmetric) at the main switchboard bus and all downstream devices containing protective devices.
  2. Breaker and fuse ratings.
  3. Generator kW and voltage ratings, percent impedance, X/R ratios, and wiring connections.
  4. Transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
  5. Identification of each bus, with voltage.
  6. Conduit materials, feeder sizes, actual lengths, and X/R ratios.
- C. Coordination Study: Perform an organized time-current analysis of each protective device in series from the individual device back to the primary source, under normal conditions, alternate operations, and emergency power conditions.
1. Graphically illustrate that adequate time separation exists between series devices, including upstream primary device.
  2. Plot the specific time-current characteristics of each protective device on log-log paper.
  3. Organize plots so that all upstream devices are clearly depicted on one sheet.
  4. Also show the following on curve plot sheets:
    - a. Device identification.
    - b. Voltage and current transformer ratios for curves.
    - c. 3-phase and 1-phase ANSI damage curves for each transformer.
    - d. No-damage, melting, and clearing curves for fuses.
    - e. Maximum short circuit cutoff point.
    - f. Simple one-line diagram for the portion of the system that each curve plot illustrates.
    - g. Software report for each curve plot, labeled for identification.
- D. Analysis: Determine ratings and settings of protective devices to minimize damage caused by a fault and so that the protective device closest to the fault will open first.

1. Required Ratings and Settings: Derive required ratings and settings of protective devices in consideration of upstream protective device settings and optimize system to ensure selective coordination.
  2. Identify any equipment that is underrated as specified.
  3. Identify existing protective devices that will not achieve required coordination and cannot be field adjusted to do so.
  4. Identify specified protective devices that will not achieve required protection or coordination but with minor changes can be made to do so; provide such modified devices at no additional cost to Owner and identify them on submittals as "revised in accordance with Protective Device Coordination Study"; minor changes include different trip sizes in the same frame, time curve characteristics of induction relays, CT ranges, etc.
  5. Identify specified protective devices that will not achieve required protection or coordination and cannot be field adjusted to do so, and for which adequate devices would involve a change to the contract sum.
  6. In all cases where adequate protection or coordination cannot be achieved at no extra cost to Owner, provide a discussion of alternatives and logical compromises for best achievable coordination.
  7. Do not order, furnish, or install protective devices that do not meet performance requirements unless specifically approved by Architect.
- E. Protective Device Rating and Setting Chart: Summarize in tabular format the required characteristics for each protective device based on the analysis; include:
1. Device identification.
  2. Relay CT ratios, tap, time dial, and instantaneous pickup.
  3. Circuit breaker sensor rating, long-time, short-time, and instantaneous settings, and time bands.
  4. Fuse rating and type.
  5. Ground fault pickup and time delay.
  6. Input level and expected response time at two test points that are compatible with commonly available test equipment and the ratings of the protective device.
  7. Highlight all devices that as furnished by Contractor will not achieve required protection.

#### **1.08 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 Qualifications: Qualified engineer of switchgear manufacturer or approved professional engineer.

- B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.
  - 1. Acceptable Software Products:
    - a. ETAP/Operation Technology, Inc: [www.etap.com/#sle](http://www.etap.com/#sle).
    - b. SKM Systems Analysis, Inc: [www.skm.com/#sle](http://www.skm.com/#sle).
    - c. or approved.
- C. Contractor Responsibility: Provide all project-related data needed by study preparer, including equipment, wire sizes, insulation types, conduit types, and actual circuit lengths.
- D. Owner's Responsibility: Provide data on relevant Owner power distribution equipment.

## **PART 2 PRODUCTS**

### **2.01 PROTECTIVE DEVICES**

- A. Provide protective devices of ratings and settings as required so that the protective device closest to the fault will open first.
- B. Replace existing protective devices to achieve specified performance.
- C. The specified equipment has been designed and selected to achieve the specified performance; ensure that equipment actually installed provides that performance.
- D. In addition to requirements specified elsewhere, provide overcurrent protective devices having ratings and settings in accordance with results of this analysis.

## **PART 3 EXECUTION**

### **3.01 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - 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.
- E. Provide the services of a qualified field engineer and necessary tools and equipment to test, calibrate, and adjust the installed protective devices to conform to requirements determined by the coordination analysis.
- F. Adjust installed protective devices having adjustable settings to conform to requirements determined by the coordination analysis.
- G. Submit detailed reports indicating inspection and testing results, and final adjusted settings.

**END OF SECTION**

**SECTION 26 05 83**  
**WIRING CONNECTIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical connections to equipment.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Materials and Methods.
- B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 05 34 - Conduit for Electrical Systems.
- D. Section 26 05 37 - Boxes for Electrical Systems.
- E. Section 26 27 26 - Wiring Devices.
- F. Section 26 28 18 - Enclosed Switches.

**1.03 REFERENCE STANDARDS**

- A. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
  - 2. Determine connection locations and requirements.
  - 3. Conduit, wire and circuit breaker sizes for mechanical equipment and equipment furnished under other Divisions are based on the equipment ratings of one manufacturer. The equipment actually furnished may have different electrical characteristics. Conduit, wire, and circuit breakers shall not be ordered or installed until exact electrical requirements are obtained. Responsibility for this coordination shall rest with the Contractor.
  - 4. Verify special purpose outlet NEMA configuration and ampere rating with equipment supplier prior to ordering devices and coverplates.
- B. Sequencing:
  - 1. Install rough-in of electrical connections before installation of equipment is required.
  - 2. Make electrical connections before required start-up of equipment.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.



- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- 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.

## **1.06 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 MATERIALS**

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
  - 1. Colors: Comply with NEMA WD 1.
  - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
  - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Enclosed Switches: As specified in Section 26 28 18.
- C. Wiring Devices: As specified in Section 26 27 26.
- D. Flexible Conduit: As specified in Section 26 05 34.
- E. Wire and Cable: As specified in Section 26 05 19.
- F. Boxes: As specified in Section 26 05 37.

### **2.02 EQUIPMENT CONNECTIONS**

- A. As indicated on drawings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

### **3.02 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.

- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

**END OF SECTION**

**SECTION 26 09 18**  
**LIGHTING CONTROL SYSTEM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Section includes a networked lighting control system comprised of the following components:
  - 1. System Software Interfaces:
    - a. Management Interface
    - b. Historical Database and Analytics Interface
  - 2. System Backbone and Integration Equipment:
    - a. System Controller
  - 3. Wired Networked Devices:
    - a. Wall Stations
    - b. Auxiliary Input/Output Devices
    - c. Occupancy and Photocell Sensors
    - d. Wall Switch Sensors
    - e. Power Packs and Secondary Packs
    - f. Relay and Dimming Panel
    - g. Communication Bridge
- B. The networked lighting control system shall meet all of the characteristics and performance requirements specified herein.
- C. The contractor shall provide, install and verify proper operation of all equipment necessary for proper operation of the system as specified herein and as shown on applicable drawings.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Electrical Materials and Methods.
- B. Section 26 05 34 - Conduit for Electrical Systems.
- C. Section 26 05 37 - Boxes for Electrical Systems: Switch outlets and installation of switch devices.
- D. Section 26 24 16 - Panelboards.
- E. Section 26 27 26 - Wiring Devices.

**1.03 REFERENCE STANDARDS**

- A. 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 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data showing dimensions and ratings for components.

- C. Shop Drawings: Indicate wiring diagrams of system, showing interface with branch circuit wiring.
- D. 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.
- E. Project Record Documents: Record actual locations of components and record circuiting and switching arrangements, including network device addresses.
- F. Maintenance Data: Include replacement parts numbers.

### **1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. ETL & ETLc Approvals: The control panels shall be tested and listed under the UL 916 Energy Management Equipment standards and CSA C22.2 #205 by a nationally recognized testing laboratory.
- C. NEC Compliance: The control system shall comply with all applicable National Electrical Codes regarding electrical wiring standards.
- D. NEMA Compliance: The control system shall comply with all applicable portions of the NEMA standards regarding the types of electrical equipment enclosures.
- E. Component Pre-testing: All control equipment shall undergo strict inspection standards. The equipment shall be previously tested and burned-in at the factory prior to installation.
- F. System Checkout: A factory trained technician or factory authorized personnel or contractor shall functionally test the control system and verify performance after installation.
- G. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- H. Products: Listed, classified, and labeled as suitable for the purpose intended.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis of design: Acuity Controls; <https://nlight.acuitybrands.com>
- B. Other acceptable Manufacturers: Provided their products meet or exceed the performance of the basis of design products.
  - 1. Greengate; [www.cooperindustries.com](http://www.cooperindustries.com)
  - 2. Legrand - Wattstopper.
- C. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 SYSTEM PERFORMANCE REQUIREMENTS**

- A. System Architecture
  - 1. System shall have an architecture that is based upon three main concepts: (1) networkable intelligent lighting control devices, (2) standalone lighting control zones using

- distributed intelligence, (3) optional system backbone for remote, time based and global operation between control zones.
2. Intelligent lighting control devices shall have individually addressable network communication capability and consist of one or more basic lighting control components: occupancy sensor, photocell sensor, relay, dimming output, contact closure input, analog 0-10V input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure shall be permissible so as to minimize overall device count of system.
  3. Lighting control zones consisting of one or more intelligent lighting control devices shall be capable of providing automatic control from sensors (occupancy and/or photocell) and manual control from local wall stations without requiring connection to a higher-level system backbone; this capability is referred to as “distributed intelligence.”
    - a. Lighting control zones of at least 128 devices per zone shall be supported.
  4. Intelligent lighting control devices shall support individual (unique) configuration of device settings and properties, with such configuration residing within the networked luminaires and intelligent control devices.
  5. Intelligent lighting control devices shall have distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones shall operate according to their defined default settings and sequence of operations.
  6. Lighting control zones shall be capable of being networked with a higher-level system backbone to provide time based control, remote control from inputs and/or systems external to the control zone, and remote configuration and monitoring through a software interface.
  7. The system may include one or more system controllers that provide time-based control and global system control across multiple control zones. The system controller also provides a means of connecting the lighting control system to a system software interface and building management systems via BACnet/IP or BACnet MS/TP protocol.
  8. The system may include “communication bridge” devices that route communication from lighting control zones to and from the system controller, for purposes of decreasing system wiring requirements.
  9. All system devices shall support remote firmware update, such that physical access to each device is not necessary, for purposes of upgrading functionality at a later date.
- B. Wired Networked Control Zone Characteristics
1. Following proper installation and provision of power, all networked devices connected together 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). The “out of box” default sequence of operation is intended to provide typical sequence of operation so as

- to minimize the system startup and programming requirements and to also have functional lighting control operation prior to system startup and programming.
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 alert installation/startup personnel.
- C. Supported Sequence of Operations
1. Characteristics and performance requirements herein shall be supported by the networked lighting control system.
  2. Control Zones
    - a. 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.
    - b. Intelligent lighting control devices located in different areas shall be able to transmit and track information within at least 128 system-wide control zones to support required sequences of operation that may span across multiple areas. Occupancy and photocell commands shall be available across a single controller, and switch commands shall be available across single or multiple controllers. These shall also be referred to as global control zones.
  3. Wall station Capabilities
    - a. Wall stations shall be provided to support the following capabilities:
      - 1) On/Off of a local control zone and global control zone simultaneously, as required.
      - 2) Continuous dimming control of light level of a local control zone and global control zone simultaneously, as required.
      - 3) Occupancy sensing control (where indicated on the drawings). Shall be configurable to control a local and global control zone simultaneously, as required. On/Off and Vacancy Sensing Modes.
    - b. 3-way / multi-way control: multiple wall stations shall be capable of controlling the same local and global control zones, so as to support “multi-way” switching, dimming, preset scene, and profile scene control.
  4. Occupancy Sensing Capabilities
    - a. Local and global control: Occupancy sensors shall be configurable to control a local and global zone simultaneously, as required.

- b. Multi-sensor control: multiple occupancy sensors shall be capable of controlling the same local and global control zones. This capability combines occupancy sensing coverage from multiple sensors without consuming multiple control zones.
- c. System shall support the following types of occupancy sensing sequence of operations:
  - 1) On/Off Occupancy Sensing
  - 2) Partial-On Occupancy Sensing
  - 3) Partial-Off Occupancy Sensing
  - 4) Vacancy Sensing (Manual-On / Automatic-Off)
- d. On/Off, Partial-On, and Partial-Off Occupancy Sensing modes shall function according to the following sequence of operation:
  - 1) 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.
  - 2) 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. 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.
  - 3) 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.
  - 4) 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.
- e. Vacancy Sensing mode (also referred to as Manual-On / Automatic-Off) shall function according to the following sequence of operation:
  - 1) 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.
  - 2) 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. 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.

- 3) 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.
  - 4) 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.
  - 5) 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.
  - f. To accommodate different types of environments, occupancy time delays before dimming or shutting off lights shall be specifiable for control zones between 15 seconds to 2 hours.
5. Photocell Sensing Capabilities (Automatic Daylight Sensing)
- a. Photocell sensing devices shall be configurable to control a local and global zone simultaneously, as required.
  - b. The system shall support the following types of photocell-based control:
    - 1) On/Off: The control zone is automatically turned off if the photocell reading exceeds the defined setpoint and automatically turned on if the photocell reading is below the defined setpoint. An adjustable time delay or adaptive setpoint behavior may be used to prevent the system from exhibiting nuisance on/off switching, as well as a dead band to prevent on/off cycling.
    - 2) 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.
6. Schedule and Global Profile Capabilities



- a. 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 wall station input, RS-232/RS-485 command, 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.
- b. Global profiles may be scheduled with the following capabilities:
  - 1) 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.
  - 2) 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.
  - 3) 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.
  - 4) 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.
  - 5) System shall support blink warning and timed extension capabilities. At the end of a scheduled period, the system shall be capable of providing a visible "blink warning" 5 minutes prior to the end of the schedule. Wall stations may be programmed to provide timed overrides that turn the lights on for an additional period of time. Timed override duration shall be programmable for each individual device, zone of devices, or customized group of devices, ranging from 5 minutes to 12 hours.
  - 6) Software management interface shall be capable of displaying a graphic calendar view of profile schedules for each control zone.
- c. System Global Profiles shall have the following additional capabilities:
  - 1) Global Profiles shall be capable of being manually activated directly from the system controller, specially programmed input devices, scene capable wall stations, and the software management interface.
  - 2) Global Profiles shall be selectable to apply to a single device, zone of devices, or customized group of devices.

- 3) Parameters that shall be configurable and assigned to a Global Profile shall include, but not be limited to, fixture light level, occupancy time delay, response to occupancy sensors (including enabling/disabling response), response to daylight sensors (including enabling/disabling response), and enabling/disabling of wall stations.
  - d. 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 wall station.
7. System shall support automated demand response capabilities with automatic reduction of light level to at least three levels of demand response.

### **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.
  - a. Management interface must be compatible with industry-standard web browser clients, including, but not limited to, Microsoft Internet Explorer®, Apple Safari®, Google Chrome®, Mozilla Firefox®.
  - b. 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.
  - c. Management interface shall support at least three permission levels for users: read-only, read & change settings, and full administrative system access.
  - d. Management interface shall be capable of restricting access for user accounts to specific devices within the system.
  - e. All system devices shall be capable of being given user-defined names.
  - f. The following device identification information shall be displayed in the Management interface: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.
  - g. 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 Scenes or Profiles.
  - h. 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.

- i. Management interface shall be able to change the current active settings and default settings for an individual networked luminaire or intelligent control device.
- j. Management interface shall be capable of applying settings changes for a zone of devices or a group of selected devices using a single “save” action that does not require the user to save settings changes for each individual device.
- k. A printable network inventory report shall be available via the management interface.
- l. A printable report detailing all system profiles shall be available via the management interface.
- m. All sensitive information stored by the software shall be encrypted.
- n. All system software updates must be available for automatic download and installation via the internet.

**B. Historical Database and Analytics Interface**

1. System shall provide a historical database that stores device operational history and calculates energy usage for all networked luminaires and intelligent control devices.
2. System shall be capable of reporting lighting system events and performance data back to the historical database for display and analysis.
3. Historical database shall be capable of recording historical data for up to 20,000 networked devices for a period of at least 1 calendar year.
4. An “Energy Scorecard” shall be displayed that shows calculated energy savings in dollars, kWh, or CO<sub>2</sub>.
5. Software shall calculate the allocation of energy savings to different control measures (occupancy sensors, photocells, manual switching, etc.).
6. Energy savings data shall be calculated for the system as a whole or for individual zones.
7. A time scaled graph showing all relay transitions shall be presented.
8. A time scaled graph showing a zones occupancy time delay shall be presented
9. A time scaled graph showing the total light level shall be presented.
10. User shall be able to customize the baseline run-time hours for a space.
11. User shall be able to customize up to four time-of-day billing rates and schedules.
12. Historical data shall be exportable from the Historical Database via a “CSV” type of file format.

**2.04 SYSTEM BACKBONE AND SYSTEM INTEGRATION EQUIPMENT**

**A. Digital Electronic Time Clock (DTC):**

1. DTC shall control and program a linear bus of lighting devices and supply all time functions without connections to a system controller.
2. DTC shall be capable of up to 32 schedules. Each schedules shall consist of one set of On and Off times per day for each day of the week and for each of two holiday lists. The

schedules shall apply to any individual relay or group of relays.

3. DTC shall be run from non-volatile memory so that all system programming is retained indefinitely.
4. DTC shall be mounted inside of a relay panel. Installation inside of the relay panel shall eliminate the necessity of any additional enclosures for complete installation.
5. DTC shall have capacitive 3.5" full color touch screen.

## **2.05 WIRED NETWORKED DEVICES**

### **A. Wired Networked Wall Switches, Dimmers, Scene Controllers**

1. Product Series: nPODM, nPODM xS, nPODM xL
2. Devices shall recess into single-gang switch box and fit a standard GFI opening.
3. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
4. All switches 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.
5. Devices with mechanical push-buttons shall provide tactile and LED user feedback.
6. Devices with mechanical push-buttons shall be made available with custom button labeling.
7. Wall switches & dimmers shall support the following device options:
  - a. Number of control zones: 1, 2 or 4
  - b. Control Types Supported:
    - 1) On/Off
    - 2) On/Off/Dimming
  - c. Colors: Ivory, White, Light Almond, Gray, Black, Red (as selectrd by Atchitect).
  - d. Wall Plates: See specification section 26 27 26 - Wiring Devices, Part 2.07.

### **B. Wired Networked Digital Key Switches**

1. Product Series: nPOD KEY.
2. Devices shall recess into single-gang switch box and fit a standard GFI opening.
3. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
4. All switches shall have the ability to detect when it is not receiving valid communication and visually indicate a potential wiring issue.
5. Devices shall have LED user feedback to provide indication of on/off status of the programmed lights or scene, as well as indication of device power.
6. Digital key switches shall support the following device options:
  - a. Control Types Supported:
    - 1) On/Off
    - 2) On/Off/Dimming

- b. Colors: White
  - c. Wall Plates: See specification section 26 27 26 - Wiring Devices, Part 2.07.
- C. Wired Networked Auxiliary Input / Output (I/O) Devices
1. Product Series: nIO-1S, nIO-RLX, nIO-MLO-5STEPA, nIO-MLO-AB, nIO-NLI, nIO-X, nIO-D, nIO-EZ-PH, nIO-EZD
  2. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a ½" knockout.
  3. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
  4. Auxiliary Input/Output Devices shall be specified as an input or output device with the following options:
    - a. Contact closure or Pull High input
      - 1) Input shall be programmable to support maintained or momentary inputs that can activate local or global scenes and profiles, activate lights at a preconfigured level, ramp light level up or down, or toggle lights on/off.
    - b. 0-10V analog input
      - 1) Input shall be programmable to function as a daylight sensor.
    - c. RS-232/RS-485 digital input
      - 1) Input supports activation of up to 4 local or global scenes and profiles, and on/off/dimming control of up to 16 local control zones.
    - d. 0-10V dimming control output, capable of sinking up to 20mA of current
      - 1) Output shall be programmable to support all standard sequence of operations supported by system.
- D. Wired Networked Occupancy and Photosensors
1. Product Series: nCM.
  2. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
  3. Sensors shall be dual-technology type and utilize passive infrared (PIR) and microphonic (or ultrasonic) technology, to detect occupant presence.
  4. Sensors shall be ceiling mount.
  5. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
  6. All sensors shall have the ability to detect when it is not receiving valid communication and visually indicate a potential wiring issue.
  7. Sensor programming parameter shall be available and configurable remotely from the software and locally via the device push-button.

8. Ceiling mount occupancy sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).
  9. Sensors shall be available with one or two occupancy “poles”, each of which provides a programmable time delay.
  10. Sensors shall have optional features for photosensor/daylight override, automatic dimming control, and low temperature/high humidity operation.
  11. Photosensor shall provide for an on/off set-point, and a dead band to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.
  12. 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.
  13. Dead band setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
  14. 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.
- E. Wired Networked Wall Switch Sensors
1. Product Series: nWSX
  2. Devices shall recess into single-gang switch box and fit a standard GFI opening.
  3. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
  4. All wall switch sensors shall have the ability to detect when it is not receiving valid communication and visually indicate a potential wiring issue.
  5. Devices with mechanical push-buttons shall provide tactile user feedback.
  6. Wall switches sensors shall support the following device options:
    - a. User Input Control Types Supported: On/Off or On/Off/Dimming
    - b. Occupancy Sensing Technology: Dual Technology type.
    - c. Colors: White
    - d. Wall Plates: See specification section 26 27 26 - Wiring Devices, Part 2.07.
- F. Wired Networked Power Packs and Secondary Packs
1. The intent is for lighting control to be centrally contained in a relay panel. Power packs shall only be utilized if needed for specific purpose or location that may not be accommodated by components in the relay panel.
  2. Product Series: nPP16, nPP16-ER, nPP20-PL, nSP16.

3. 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.
4. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC) and carry a plenum rating.
5. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output, but shall not be required to contribute system power.
6. Power Supplies shall provide system power only, but are not required to switch line voltage circuit.
7. Auxiliary Relay Packs shall switch low voltage circuits only, capable of switching 1 amp at 40 VAC/VDC (resistive only).
8. 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.
9. Power Pack programming parameters shall be available and configurable remotely from the software and locally via the device push-button.
10. 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.
11. 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.
12. Power/Secondary Packs shall be available with the following options:
  - a. Power Pack capable of full 16-Amp switching of all normal power lighting load types, with optional 0-10V dimming output capable of up to 100mA of sink current.
  - b. Secondary Pack with UL924 listing for switching of full 16-Amp Emergency Power circuits, with optional 0-10V dimming output capable of up to 100mA of sink current.
  - c. Power and Secondary Packs capable of full 20-Amp switching of general purpose receptacle (plug-load) control.
  - d. Secondary Pack capable of full 16-Amp switching of all normal power lighting load types.

G. Wired Networked Relay and Dimming Panel

1. Product Series: ARP
2. Relay and dimming panel shall be available with individual relays per panel, with an equal number of individual 0-10V dimming outputs.

3. Optional Field Configurable Relays (FCR) used shall have the following required properties:
  - a. Configurable in the field to operate with single-, double-, or triple-pole relay groupings.
  - b. Configurable in the field to operate with normally closed or normally open behavior.
  - c. Provides visual status of current state and manual override control of each relay.
  - d. Listed for the following minimum ratings:
    - 1) 16A @ 120-277VAC Electronic
    - 2) 2HP @ 120VAC
    - 3) 3HP @ 240-277VAC
    - 4) 65kA SCCR @ 480VAC
4. 0-10 dimming outputs shall support a minimum of 100mA sink current per output.
5. Relay and dimming outputs shall be individually programmable to support all standard sequence of operations as defined in this specification.
6. Panel shall be UL924 listed for control of emergency lighting circuits.
7. Panel shall power itself from an integrated 120-277 VAC or optional 347VAC supply.
8. Panel shall provide a configurable low-voltage sensor input with the following properties:
  - a. Configurable to support any of the following input types:
    - 1) Indoor Photocell
    - 2) Outdoor Photocell
    - 3) Occupancy Sensor
    - 4) Contact Closure
  - b. Low voltage sensor input shall provide +24VDC power for the sensor so that additional auxiliary power supplies are not required.
  - c. Sensor input supports all standard sequence of operations as defined in this specification.
9. Panel shall provide a contact closure input that acts as a panel override to activate the normally configured state of all relays (i.e., normally open or normally closed) in the panel. This input is intended to provide an interface to alarm systems, fire panels, or BMS system to override the panel.
10. Panel shall supply current limited low voltage power to other networked devices connected via low voltage network cable.
11. Panel shall be available with NEMA 1 rated enclosure with the following properties:
  - a. Surface-mounted or flush mounted enclosure back box.
  - b. Screw-fastened cover or hinged cover with key lock.
12. Panel shall be rated from 0-50C.

H. Wired Networked Communication Bridge



1. Product Series: nBRG
2. Device shall surface mount to a standard 4" x 4" square junction box.
3. Device shall have 8 RJ-45 ports for connection to lighting control zones (up to 127 devices per port), additional network bridges, and System Controller.
4. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to System Controller.
5. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply, or powered via low voltage network connections from powered lighting control devices (e.g. power packs).
6. Wired Bridge shall be capable of redistributing power from its local supply and connected lighting control zones with excess power to lighting control zones with insufficient local power. This architecture also enables loss of power to a particular area to be less impactful on network lighting control system.

## **2.06 POWER LIMITED WIRE AND CABLE**

- A. Per manufacturer's requirements.
- B. Provide plenum rated cable where routing in plenum spaces.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install wiring in the following locations in conduit in accordance with Section 26 05 34:
  1. Within walls.
  2. Above inaccessible ceilings.
  3. Within hollow spaces used as air handling ducts and plenums.
  4. Exposed along surfaces.
- B. Install relays to be accessible. Allow space for adequate ventilation and circulation of air.
- C. The control system shall be installed and fully wired by the installing contractor. The contractor shall complete all electrical connections to all control circuits, and wiring.
- D. Test low voltage network cable included in the bid. Verify the following minimum parameters:
  1. Wire Map (continuity, pin termination, shorts and open connections, etc.)
  2. Length
  3. Insertion Loss
- E. Coordination with Owner's IT Network Infrastructure
  1. Coordinate with the owner's representative to secure all required network connections to the owner's IT network infrastructure.
    - a. Provide to the owner's representative all network infrastructure requirements of the networked lighting control system.

- b. Provide to the manufacturer's representative all necessary contacts pertaining to the owner's IT infrastructure, to ensure that the system is properly connected and started up.
- F. The control functions of the lighting control system, including, but not limited to, time clock, relays, occupancy sensors, daylight responsive sensors, and user manual controls shall be commissioned per state energy code requirements with a representative from the owner and owner's agent to ensure that the equipment and devices are calibrated, adjusted, and operate in accordance with the drawings and specifications. A complete report of commissioning procedures and results, including as-built system setup and parameter information shall be prepared and filed with the owner, sensor locations are diagrammatic and shall be coordinated with a system manufacturer representative and building features for proper placement prior to rough-in.

### **3.02 SCHEDULES**

- A. Provide computer generated circuit schedule indicating replay number, load being served, power panel name and circuit number.

### **3.03 PRODUCT SUPPORT AND SERVICE**

- A. Factory telephone support shall be available at no cost to the Owner.
- B. A minimum of 4 hours of on-site factory support shall be available at no cost to the Owner. Additional hours may be negotiated by the Contractor or Owner.
- C. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

### **3.04 SYSTEM DELIVERY AND ACCEPTANCE**

- A. The contractor is responsible for complete installation of the entire system according to strict factory standards and requirements.
  1. All system equipment shall operate in accordance with specification and industrial standard procedures.
  2. An operational user program shall exist in the control system. The program shall execute and perform all functions required to effectively operate the site.
  3. Demonstration of program integrity during normal operation and pursuant to a power outage.
  4. Contractor shall provide a minimum of six training hours on the operation and use of the control system and software. Additional support services shall be negotiated between the contractor and the building owner or manager.
- B. System start-up and programming shall include:
  1. Verifying operational communication to all system devices.

2. Programming the network devices into functional control zones to meet the required sequence of operation.
  3. Programming and verifying all sequence of operations.
  4. Customization of owner's software interfaces and applications.
- C. Initial start-up and programming is to occur on-site. Additional programming may occur on-site or remotely over the Internet as necessary.
- D. System Documentation
1. Submit software database file with desired device labels and notes completed. Changes to this file will not be made by the factory.
- E. Project closeout documentation shall include a copy of the commissioning report and final state lighting compliance forms and calculations that document interior and exterior lighting area and/or surface types, lighting power allowances, and installed w/sf lighting densities.

### **3.05 WARRANTY**

- A. Manufacturer shall supply a 2-year warranty on all hardware and software and shall cover repair or replacement of defective products within the warranty period.

**END OF SECTION**

**SECTION 26 24 16**  
**PANELBOARDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.
- D. Metering.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 00 01 - Basic Materials and Methods.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- D. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 28 13 - Fuses: Fuses for fusible switches and spare fuse cabinets.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1 - Panelboards 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- 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.

#### **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 01 30 00 - 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.
- D. Field Quality Control Test Reports.
- E. Manufacturer's Installation 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.
- F. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- G. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Panelboard Keys: One for each panelboard installed.
  - 3. See Section 26 28 13 for requirements for spare fuses and spare fuse cabinets.

## **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

## **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.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. ABB/GE: [www.electrification.us.abb.com/#sle](http://www.electrification.us.abb.com/#sle).
- B. Eaton Corporation: [www.eaton.com/#sle](http://www.eaton.com/#sle).
- C. Schneider Electric; Square D Products: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
- D. Siemens Industry, Inc: [www.usa.siemens.com/#sle](http://www.usa.siemens.com/#sle).
- E. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this 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 indicated on the drawings.

- 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, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
  - 2. Provide 200 percent rated neutral bus and lugs where oversized neutral conductors are provided.
  - 3. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
  - 4. Provide separate isolated/insulated ground bus where indicated.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: 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 removable end walls for NEMA Type 1 enclosures.
    - d. Provide painted steel boxes for surface-mounted panelboards, 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. 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.
2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
  - a. Use zero sequence ground fault detection method unless otherwise indicated.
  - b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
- L. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
- M. Provide the following features and accessories where indicated or where required to complete installation:
  1. Feed-through lugs.
  2. Main breaker.
  3. Double 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.
- B. Conductor Terminations:
  1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  2. Main and Neutral Lug Type: Compression.
- C. Bussing:
  1. Phase and Neutral Bus Material: Aluminum or copper.
  2. Ground Bus Material: Copper.
- D. Circuit Breakers:
  1. Provide bolt-on type.
  2. Provide thermal magnetic circuit breakers unless otherwise indicated.
- E. Enclosures:
  1. Provide surface-mounted enclosures as indicated.
  2. Fronts: Provide trims to cover access to load terminals, wiring gutters, and other live parts, with exposed access to overcurrent protective device handles.

### **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: Compression.
- 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: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type.
- E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
  2. Fronts: Provide hinged door trim with hinged cover for access to load terminals and wiring gutters that are fastened closed with screws, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
  3. Provide 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.
    - 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 for circuit breaker frame sizes less than 400 amperes.
    - b. Provide compression lugs for circuit breaker frame sizes 400 amperes and above.
    - c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors of full breaker ampacity rating.
  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. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.
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. Provide where required by applicable code.
8. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving lighting.
9. Do not use tandem circuit breakers.
10. Do not use handle ties in lieu of multi-pole circuit breakers.
11. 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.

## **2.06 METERING**

- A. Metering Transformer Cabinets: Sheet metal cabinet with hinged door, conforming to utility company requirements, with provisions for locking and sealing.
  1. Size: As required by utility.
- B. Meter Base: As required by utility company.
- C. Other Components: As required by utility company.

## **2.07 SOURCE QUALITY CONTROL**

- A. Factory test panelboards according to NEMA PB 1.

## **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 26 05 29.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the top of panelboard is 6 feet 6 inches above the floor or working platform. Install panelboards taller than 6 feet with bottom no more than 4 inches above the floor.
- I. Mount floor-mounted power distribution panelboards on properly sized 3 inch or 4 inch high concrete pad constructed in accordance with Section 03 30 00.
- J. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling.
- K. Provide grounding and bonding in accordance with Section 26 05 26.
  - 1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
  - 2. Terminate branch circuit isolated grounding conductors on isolated/insulated ground bus only. Do not terminate on solidly bonded equipment ground bus.
- L. Install all field-installed branch devices, components, and accessories.
- M. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- N. Set field-adjustable circuit breaker tripping function settings as required.
- O. Set field-adjustable ground fault protection pickup and time delay settings as required.
- P. Provide filler plates to cover unused spaces in panelboards.
- Q. 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. Communications equipment circuits.
  - 4. Intrusion detection and access control system circuits.
  - 5. Video surveillance system circuits.
- R. Identify panelboards in accordance with Section 26 05 53.

1. Provide computer generated circuit directory for each lighting and appliance panelboard and each power distribution panelboard provided with a door, clearly and specifically indicating the loads served. Identify spares and spaces.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform inspection, testing, and adjusting in accordance with Section 01 40 00.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. 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 800 amperes. Tests listed as optional are not required.
  1. Perform insulation-resistance tests on all control wiring with respect to ground.
  2. Test functions of the trip unit by means of secondary injection.
- E. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
  1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.
- F. Test GFCI circuit breakers to verify proper operation.
- G. Test shunt trips to verify proper operation.
- H. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.
- I. 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**

**SECTION 26 27 26**  
**WIRING DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Fan speed controllers.
- C. Receptacles.
- D. Wall plates.
- E. Occupancy sensors (Analog Type).

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Materials and Methods.
- B. Section 26 05 37 - Boxes for Electrical Systems.
- C. Section 26 05 35 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.
- D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 05 83 - Wiring Connections: Cords and plugs for equipment.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- 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 1472 - Solid-State Dimming Controls Current Edition, Including All Revisions.
- M. UL 1917 - Solid-State Fan Speed Controls 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 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
1. Wall Dimmers: Include derating information for ganged multiple devices.
- C. Samples: One for each type and color of device and wall plate specified.
- D. Field Quality Control Test Reports.
- E. Manufacturer's Installation 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.
- F. Operation and Maintenance Data:
1. Wall Dimmers: Include information on operation and setting of presets.
  2. GFCI Receptacles: Include information on status indicators.
- G. Project Record Documents: Record actual installed locations of wiring devices.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
  2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
  3. Extra Keys for Locking Switches: Five of each type.

## **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.

## **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

## **PART 2 PRODUCTS**

### **2.01 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles for receptacles installed in dwelling units in locations as identified in NEC 406.12
  - 1. Child care, preschool, and education facilities.
  - 2. Business offices, corridors (or similar).
  - 3. Assembly occupancies.
- E. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- F. Provide GFCI protection for receptacles for all 15A and 20A, 125V receptacles in non-dwelling type kitchens.
- G. Provide GFCI protection for receptacles serving electric drinking fountains.
- H. Unless noted otherwise, do not use combination switch/receptacle devices.
- I. For flush floor service fittings, use tile rings for installations in tile floors.
- J. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

### **2.02 ALL WIRING DEVICES**

- A. Provide products listed and classified by Underwriter Laboratories, Inc. as suitable for the purpose specified and indicated.
- B. Source Limitations: Where possible, for each type of wiring device furnish products produced by a single manufacturer and obtained from a single supplier.
- C. Finishes
  - 1. Provide wiring device finishes as described below unless otherwise indicated.

2. All Wiring Devices: Color as selected by the Architect with wall plate as specified in wall plates section.
3. Wiring Devices Installed in Finished Spaces: Color as selected by Architect with wall plate as specified in wall plates section.
4. Wiring Devices Installed in Unfinished Spaces: Color as selected by Architect with wall plate as specified in wall plates section.
5. Wiring Devices Installed in Wet or Damp Locations: Color as selected by Architect with specified weatherproof cover.

### **2.03 WALL SWITCHES**

- A. Manufacturers:
  1. Hubbell Incorporated: [www.hubbell.com/#sle](http://www.hubbell.com/#sle).
  2. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  4. Cooper Wiring Devices: [www.cooperwiringdevices.com](http://www.cooperwiringdevices.com).
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. 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 with separate ground terminal screw.
- C. 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.
  1. Products:
    - a. Hubbell 1221 Series.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.04 FAN SPEED CONTROLLERS**

- A. Installation:
  1. Large indoor ceiling fans are furnished and installed by Division 21.
  2. Smaller ceiling fans for the Three Seasons space are furnished and installed by Division 11.
  3. Provide electrical connection to ceiling fan as indicated on the drawings. Include raceway and conductor to serve control devices as specified by Division 11 and Division 21.

### **2.05 RECEPTACLES**

- A. Manufacturers:
  1. Hubbell Incorporated: [www.hubbell.com/#sle](http://www.hubbell.com/#sle).
  2. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).



3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  4. Cooper Wiring Devices: [www.cooperwiringdevices.com](http://www.cooperwiringdevices.com).
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. 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.
  3. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.
- C. Convenience Receptacles:
1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R ; single or duplex as indicated on the drawings.
    - a. Products:
      - 1) Hubbell 5362 (20A).
      - 2) Hubbell 5262 (15A).
      - 3) Substitutions: See Section 01 60 00 - Product Requirements.
  2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R ; single or duplex as indicated on the drawings.
    - a. Products:
      - 1) Hubbell 5362 C1GRYTR (20A).
      - 2) Hubbell 5262 C1GRYTR (15A).
      - 3) Substitutions: See Section 01 60 00 - Product Requirements.
  3. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R , listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
    - a. Products:
      - 1) Hubbell 5362WR (20A).
      - 2) Hubbell 5262WR (15A).
      - 3) Substitutions: See Section 01 60 00 - Product Requirements.
  4. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R , listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
    - a. Products:

- 1) Hubbell BR20 Series (20A).
  - 2) Hubbell BR15 Series (15A).
  - 3) Substitutions: See Section 01 60 00 - Product Requirements.
5. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R , listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- a. Products:
    - 1) Hubbell BR20 Series (20A).
    - 2) Hubbell BR15 (15A).
    - 3) Substitutions: See Section 01 60 00 - Product Requirements.
- D. 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 and/or 15A, 125V, NEMA-15R , rectangular decorator style.
    - a. Products:
      - 1) Hubbell GFR5362 Series (20A).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R , rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
    - a. Products:
      - 1) Hubbell GFR5362 Series (20A).
      - 2) Hubbell GFR5262 Series (15A).
      - 3) Substitutions: See Section 01 60 00 - Product Requirements.
  4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R , rectangular decorator style, listed and labeled as tamper resistant type.
    - a. Products:
      - 1) Hubbell GFTR20 Series (20A).
      - 2) Hubbell GFTR15 Series (15A).
      - 3) Substitutions: See Section 01 60 00 - Product Requirements.

5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R and/or 15A, 125V, NEMA-15R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
  - a. Products:
    - 1) Hubbell GFTR20 Series (20A).
    - 2) Hubbell GFTR15 Series (15A).
    - 3) Substitutions: See Section 01 60 00 - Product Requirements.

## 2.06 WALL PLATES

- A. Manufacturers:
  1. Hubbell Incorporated: [www.hubbell-wiring.com/#sle](http://www.hubbell-wiring.com/#sle).
  2. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. 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.
  4. Provide screwless wallplates with concealed mounting hardware where indicated.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- E. Allowed only in Mechanical Mezzanine space.
- F. Weatherproof 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.

## 2.07 OCCUPANCY SENSORS (ANALOG TYPE)

- A. Manufacturers:
  1. Basis of design; Sensor Switch: [www.sensorswitch.acuitybrands.com](http://www.sensorswitch.acuitybrands.com). Part numbers indicated are Wattstopper; equals by other manufacturers are acceptable, provided they are of the same manufacturer as the Lighting Control System specified in Section 26 09 18.
  2. Wattstopper: [www.legrand.us/wattstopper](http://www.legrand.us/wattstopper).
  3. Hubbell Incorporated: [www.hubbell-wiring.com](http://www.hubbell-wiring.com).
  4. Sensor Switch: [www.sensorswitch.com](http://www.sensorswitch.com).
  5. Leviton Manufacturing Company, Inc.: [www.leviton.com](http://www.leviton.com).

6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Sensors to be dual technology type with integral 24-volt dry contact for use with energy management system, unless otherwise indicated.
- C. Sensors to have manual-on operation.
- D. Sensors to be provided with coverage pattern and mounting as shown on drawings.
- E. The drawings show approximate locations of sensors and are diagrammatic only. Exact locations of detectors are to be field verified with the factory representative prior to mounting.
- F. Provide power pack as necessary for low voltage occupancy sensors. Sensor Switch PP20 Series.
- G. Provide 20A rated power pack as necessary for controlled receptacles. Sensor Switch PP20.
- H. Wall Switch:
  1. Dual Technology: Wattstopper DW-100 Series. Sensorswitch
    - a. Coverage area up to 500 sq. ft. with 180 degrees field of view.
    - b. Where 3-way control is noted provide with Multi-way Operation option (MWO).
- I. Ceiling Mount (360 degrees):
  1. Dual Technology: Sensor Switch CMPDT Series.
  2. Coverage area up to 500 sq. ft. with 360 degrees field of view.
- J. Ceiling/Wall Mount (Directional):
  1. Dual Technology: Sensor Switch #CMR PDT10.
    - a. Coverage area up to 700 sq. ft.

### **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 openings in access floor are in proper locations.
- I. 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 26 05 37 as required for installation of wiring devices provided under this section.
  - 1. Mounting Heights: Unless otherwise indicated, as follows:
  - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
  - 3. 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.
  - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
  - 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- 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. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.
- I. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- J. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- K. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- L. Install wall switches with OFF position down.
- M. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- N. Do not share neutral conductor on branch circuits utilizing wall dimmers.

- O. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on right.
- P. 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.
- Q. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- R. Identify wiring devices in accordance with Section 26 05 53.
- S. Install poke-through closure plugs in each unused core holes to maintain fire rating of floor.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform field inspection, testing, and adjusting in accordance with Section 01 40 00.
- C. Inspect each wiring device for damage and defects.
- D. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- E. Test each receptacle to verify operation and proper polarity.
- F. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- 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.
- B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

### **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**

**SECTION 26 28 13**  
**FUSES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fuses.
- B. Spare fuse cabinet.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Electrical Materials and Methods.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 28 18 - 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 248-8 - Low-Voltage Fuses - Part 8: Class J Fuses Current Edition, Including All Revisions.
- F. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses Current Edition, Including All Revisions.
- G. 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 26 28 18.
  - 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 01 30 00 - 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. Spare Fuse Cabinet: Include dimensions.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Fuses: One set(s) of three for each type and size installed.
  - 3. Fuse Pullers: One set(s) compatible with each type and size installed.
  - 4. Spare Fuse Cabinet Keys: Two.

## 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.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Bussmann, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
- B. Littelfuse, Inc: [www.littelfuse.com/#sle](http://www.littelfuse.com/#sle).
- C. Mersen: [ep-us.mersen.com/#sle](http://ep-us.mersen.com/#sle).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 APPLICATIONS

- A. Feeders:
  - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
  - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B. General Purpose Branch Circuits: Class RK1, time-delay.
- C. Individual Motor Branch Circuits: Class RK1, time-delay.
- D. Primary Protection for Control Transformers: Class CC, time-delay.

### 2.03 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.



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- H. Class J Fuses: Comply with UL 248-8.
- I. Class L Fuses: Comply with UL 248-10.
- J. Class CC Fuses: Comply with UL 248-4.
- K. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
- L. Provide the following accessories where indicated or where required to complete installation:
  - 1. Fuseholders: Compatible with indicated fuses.
  - 2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.

#### **2.04 SPARE FUSE CABINET**

- A. Description: Wall-mounted sheet metal cabinet with shelves and hinged door with cylinder lock, suitably sized to store spare fuses and fuse pullers specified.
- B. Finish: Manufacturer's standard, factory applied grey finish unless otherwise indicated.

### **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 mounting surfaces are ready to receive spare fuse cabinet.
- C. 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.
- C. Install spare fuse cabinet in convenient location in main electrical room unless otherwise indicated.
- D. Identify spare fuse cabinet in accordance with Section 26 05 53.

**END OF SECTION**

**SECTION 26 28 18**  
**ENCLOSED SWITCHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Enclosed safety switches.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Materials and Methods.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 28 13 - Fuses.

**1.03 REFERENCE STANDARDS**

- A. ANSI - American National Standards Institute Current Edition, Including All Revisions.
- B. ASME - American Society of Mechanical Engineers Current Edition, Including All Revisions.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- F. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 72 - National Fire Alarm and Signaling Code Most Recent Edition Cited by Referring Code or Reference Standard.
- 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 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.
- L. 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 01 30 00 - 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. Indicate voltage and current ratings.
- C. 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.
- D. Project Record Documents: Record actual locations of enclosed switches.
- E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. See Section 01 60 00 - Product Requirements, for additional provisions.
  2. See Section 26 28 13 for requirements for spare fuses and spare fuse cabinets.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

#### **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.

#### **1.08 FIELD CONDITIONS**

- A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Fusible / Non-Fusible Switches:
  - 1. ABB/GE: [www.electrification.us.abb.com/#sle](http://www.electrification.us.abb.com/#sle).
  - 2. Eaton Corporation: [www.eaton.com/#sle](http://www.eaton.com/#sle).
  - 3. Schneider Electric; Square D Products: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
  - 4. Siemens Industry, Inc: [www.usa.siemens.com/#sle](http://www.usa.siemens.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

### **2.02 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.
  - 2. Minimum Ratings:
    - a. Heavy Duty Single Throw Switches Protected by Class R Fuses: 200,000 rms symmetrical amperes.
- 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 insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- M. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 3R.
    - c. Hose Down Areas: Type 4X.
  - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
- N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- O. Heavy Duty Switches:
  - 1. Comply with NEMA KS 1.
  - 2. Conductor Terminations:
    - a. Provide mechanical lugs unless otherwise indicated.
    - b. Provide compression lugs where indicated.
    - 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.
    - a. Provide means for locking handle in the ON position where indicated.

### **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 26 05 29.

- 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 26 05 26.
- H. Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.
- I. Identify enclosed switches in accordance with Section 26 05 53.
- J. Furnish and install an enclosed switch at each motor and resistance heating equipment location.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Perform field inspection, testing, and adjusting in accordance with Section 01 40 00.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- E. 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**

**SECTION 26 33 23**  
**CENTRAL BATTERY EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Emergency power supply.

**1.02 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. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- D. NFPA 111 - Standard on Stored Electrical Energy Emergency and Standby Power Systems 2022.
- E. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.
- F. 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.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - 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.
- C. Manufacturer's certification that products meet or exceed specified requirements.
- D. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

**1.04 QUALITY ASSURANCE**

- A. Comply with the following:
  - 1. NFPA 111.
- B. Products: Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

**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 time required by NFPA 111 and UL 924 unless otherwise indicated.
  - 3. Provide automatic low voltage battery disconnect to prevent battery "deep discharge" damage.
- H. Enclosures:
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  - 2. Hinged Doors: Lockable, with all locks keyed alike.
  - 3. Finish: Manufacturer's standard unless otherwise indicated.
- I. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category B.
- J. 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.

## 2.02 MANUFACTURERS

- A. Myers Power Products, Inc.: [www.myerspowerproducts.com](http://www.myerspowerproducts.com).
- B. Dual-Lite: [www.dual-lite.com](http://www.dual-lite.com).



- C. On-Line Power: [www.onlinepower.com](http://www.onlinepower.com).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.03 EMERGENCY POWER SUPPLY**

- A. Description: NFPA 111 Type A, Class 1.5 stored emergency power supply system designed for Level 1 applications and consisting of rectifier/charger unit, storage battery, and solid state inverter with static transfer switch, in one or several enclosures. Provide unit suitable for operating HID lamps without extinguishing lamp on transfer.

### **2.04 RATINGS**

- A. Input Voltage: Voltage and phase as indicated on drawings.
- B. Output Power: KW and kVA as noted in drawings at 0.9 power factor.
- C. Output Voltage: Voltage and phase as noted on drawings.
- D. Inverter Output Frequency: 60 Hz plus 1 percent.
- E. Efficiency: 90 percent minimum.
- F. Maximum Recharge Time: 24 hours following 1.5 hour discharge.
- G. Total Harmonic Distortion: Less than 10 percent at full resistive load.
- H. Battery: Lead calcium, sealed type battery.
- I. Instrumentation and Alarms: NFPA 111.
- J. Charger: Dual rate, designed to maintain battery in full-charge condition during normal conditions.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install inverter assemblies plumb and level.
- C. Provide interconnection between cabinets.

### **3.02 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - 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.
- 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.
- K. Perform field inspection and testing in accordance with Section 01 40 00.
- L. Verify operation of each unit by simulating outage.

**END OF SECTION**

**SECTION 26 51 00**  
**LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Luminaires.
- B. Drivers.
- C. LED modules.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 00 01 - Basic Materials and Methods.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 26-Grounding and Bonding for Electrical Systems.
- D. Section 26 05 37 - Boxes for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information 2019.
- B. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.
- C. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- D. IESNA RP-8 - Roadway Lighting 2014.
- E. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.
- F. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2000 (Reaffirmed 2006).
- G. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.
- H. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility 2012 (Reaffirmed 2018).
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 844 - Luminaires for Use in Hazardous (Classified) Locations Current Edition, Including All Revisions.
- L. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.
- M. UL 1598 - Luminaires Current Edition, Including All Revisions.
- N. 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. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

#### 1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
  - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- 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, 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. 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. LED Modules: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
  - 4. Air Handling Luminaires: Include air handling performance data.
- D. Coefficients of Utilization by an approved testing laboratory.
- E. LED Module and driver type for each fixture.
- F. Group of fixtures with the same LED Module and driver type may reference a single set of submittal documents.

- G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

#### **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 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide 5-year manufacturer warranty for LED modules, including drivers.

### **PART 2 PRODUCTS**

#### **2.01 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. Provide the complete system of lighting fixtures and LED Modules as shown on the drawings and specified herein. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.
- E. The fixture catalog numbers listed on the drawing indicate manufacturer, fixture design, appearance, etc., desired. These fixtures shall be modified if necessary to comply with the specification herein. Lighting fixtures specified will be the basis for comparison in the consideration of fixtures of other manufacturers.
- F. All fixture component parts shall be manufactured and/or assembled at the manufacturing plant for shipment in one or more packages. The shipment from the fixture manufacturer shall include integrally-mounted and/or remote-mounted drivers where drivers are required for the proper operation of the fixture lamps.

- G. Recessed Luminaires:
  - 1. Ceiling Compatibility: Comply with NEMA LE 4.
  - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
  - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
- H. High Bay Luminaires: Provide safety chain or power hook unless otherwise indicated.
- I. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.
- J. Fixtures - General:
  - 1. Finish shall be white baked enamel, unless otherwise specified with a minimum average reflectance of 85% on all exposed and light reflecting surfaces. Steel components shall be prepared for finishing with a 5-step zinc phosphating process.
  - 2. All surface mounted lighting fixtures shall have low density label.
  - 3. All recessed lighting fixtures installed in fire rated ceiling shall be provided with fire-rated protective covers.
  - 4. All fixtures mounted outdoors or in unheated spaces shall be capable of operating at 0 degrees F.
- K. If fixtures specified herein are discontinued at the time the work is executed, provide suitable substitute fixtures, without additional cost, as directed by the engineer.
- L. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. The Manufacturers required to inform the owner of new power requirements and / or lumen output values if new replacement components prior to shipping replacement parts.
  - 3. Color temperature shall be per the luminaire schedule. The color temperature shall not exceed a +/- tolerance of greater than 2 McAdam Ellipses. Over the life of the luminaire.
  - 4. Tested in accordance with IES LM-79 and IES LM-80.
  - 5. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- M. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.
- N. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.
- O. Electrical Characteristics: 120 volts, 60 Hz, unless otherwise specified.
- P. Substitutions, unless Otherwise Indicated: See Section 01 60 00 - Product Requirements.

## 2.02 LED MODULES

- A. Manufacturers:

1. As recommended by light fixture manufacturer..
2. Substitutions: See Section 01 60 00 - Product Requirements.
3. Manufacturer Limitations: Where possible, provide lamps produced by a single manufacturer.

**B. LED Modules:**

1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
2. Verify compatibility of specified LED's with luminaires to be installed. Where LED's are not specified, provide LED's per luminaire manufacturer's recommendations.
3. Minimum Efficiency: Provide LED's complying with all current applicable federal and state LED efficiency standards.
4. Color Temperature Consistency: Unless otherwise indicated, for each type of LED furnish products which are consistent in perceived color temperature. Replace fixtures that are determined by the Architect to be inconsistent in perceived color temperature.
5. Components: UL 8750 recognized or listed as applicable.
6. Tested in accordance with IES LM-79 and IES LM-80.
7. LED Estimated Useful Life: Minimum of 50,000 hours at 70% lumen maintenance, calculated based on IES LM-80 test data.
8. Light Lumen output as indicated on the drawings.
9. Interior lighting shall have a CRI of 80 or greater if not otherwise indicated on the drawings.
10. Exterior lighting shall have a CRI of 70 or greater if not otherwise indicated on the drawings.

**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 26 05 37 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Square and rectangular fixtures shall be mounted with sides parallel to building lines and parallel with ceiling lines.
- G. Properly support and align fixtures and provide all necessary steel shapes for support of the fixtures. Recessed fixtures shall be supported at opposite corners by steel wire connected to building structure per IBC requirements. Coordinate complete fixture installation with the facility construction.
- H. Surface Mounted Fixtures: Where fixtures are indicated for installation on low density ceiling material, mount on ceiling spacers as recommended by manufacturer unless UL approved for mounting directly to ceiling material.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Remote Drivers: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.
- L. Identify luminaires connected to emergency power system in accordance with Section 26 05 53.
- M. Operate light fixtures at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace light fixture components that fail prematurely.
- N. Verify all ceiling systems and coordinate fixture type and accessories prior to ordering fixtures.
- O. Install light fixtures as recommended by the manufacturer or as necessary to provide exact horizontal alignment, preventing horizontal or vertical deflection, or angular jointing of fixtures installed in continuous rows.
- P. All lighting fixtures shall be furnished complete with LED Module and driver and all accessories necessary to provide a complete operable fixture.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - 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 emergency power light fixtures connected 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 drivers 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.

### **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 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
- D. Just prior to Substantial Completion, replace LED Modules(s) and driver(s).

### **3.08 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**

**SECTION 27 05 28**  
**PATHWAYS FOR LOW VOLTAGE SYSTEMS CABLING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Low voltage cabling systems pathways.
- B. Telecommunications & cable TV service entrance to building(s).
- C. Communications pathways.
- D. Pathway Identification.
- E. Pathways inside building(s).
- F. Enclosures, backboards, and outlet boxes.
- G. Grounding and bonding the low voltage cabling pathway system.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 26 00 01 - Basic Electrical Materials and Methods.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- D. Section 26 05 34 - Conduit.
- E. Section 26 05 53 - Identification for Electrical Systems.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. See Section 01 23 00 - Alternates, for product alternatives affecting this section.

**1.04 REFERENCE STANDARDS**

- A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; Consumer Electronics Association ; current version, with addenda.
- B. TIA-568.1 - Commercial Building Telecommunications Cabling Standard; Telecommunications Industry Association ; current version, with addenda..
- C. TIA-568.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Telecommunications Industry Association ; current version, with addenda.
- D. TIA-569 - Telecommunications Pathways and Spaces; current version, with addenda.
- E. TIA-606 - Administration Standard for Telecommunications Infrastructure, current version with addenda.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

## 1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 1 year period after Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 SYSTEM DESIGN

- A. Provide a complete permanent system of cabling pathways for low-voltage system cabling including but not limited to: Voice and data communications, lighting controls and HVAC controls, including conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlet boxes.
- B. Drawings may indicate specific raceway requirements for some locations. The contractor is responsible for including the specific raceway requirements indicated in addition to those required of this and related specification sections.
- C. Provide conduit as indicated by related system device and/or equipment specification section to facilitate cable installation and as follows:
  - 1. Where cable is not allowed by applicable code to be routed in accessible ceiling spaces or in free-air.
  - 2. Where cable is allowed by applicable code to be routed in accessible ceiling spaces or in free-air.
    - a. From the Main Distribution Frame (MDF) into accessible ceiling space.
    - b. From low voltage device outlet to an accessible ceiling space.
      - 1) For Voice and Data outlets:
        - (a) Provide minimum 1 inch conduit for CAT 5E and CAT 6 cable, 1-1/4 inch conduit for CAT 6A cable, from outlet box to accessible ceiling. See drawings for additional requirements.
      - 2) All other low-voltage device outlets:
        - (a) As indicated on the drawings.
  - 3. Where routing cable across inaccessible ceiling spaces longer than 10 feet:
    - a. Provide sufficient quantity and sized conduit sleeves to not exceed 40% cable fill per conduit provided.

### 2.02 PATHWAYS

- A. Conduit: As specified in Section 26 05 34.
- B. Boxes: As specified in Section 26 05 37 and as specified herein.
- C. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.
  - 1. Convert to GRC (elbow and riser) prior to rising above ground.

### **2.03 IDENTIFICATION PRODUCTS**

- A. Comply with TIA-606.
- B. Comply with Section 26 05 53.

### **2.04 ENCLOSURES/BACKBOARDS**

- A. Backboards: Interior grade ACX or better plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
  - 1. Panel Size: 48 inches wide by 96 inches high. Provide minimum of one panel or quantity as necessary to accomplish coverage shown on drawings.
  - 2. Do not paint over UL label.
  - 3. Provide ground bus bar and #6 AWG insulated CU ground conductor to service ground, as specified in Section 26 05 26.

### **2.05 DEVICE OUTLET BOXES**

- A. Unless otherwise specified in related device's system section; flush mount outlet box depth shall be as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
  - 1. Size, Unless Otherwise Indicated: 4 inches square by 2-1/8 inches deep.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION - GENERAL**

- A. Firestopping: Seal openings around pathway penetrations through fire-related walls, partitions, floors, and ceilings in accordance with Section 07 84 00.

### **3.02 INSTALLATION OF PATHWAYS**

- A. Underground: Install conduit at least 24 inches below finish grade.
- B. Install with minimum clearances per Section 26 05 34.
- C. In addition to as specified in Section 26 05 34, provide pull string in all conduits where there is available conduit fill capacity for future cable installation.

### **3.03 INSTALLATION OF DEVICE OUTLET BOXES**

- A. Install per Section 26 05 37.
- B. Mounting heights: Unless otherwise indicated, as follows:
  - 1. Voice and Data Outlets: 18 inches above finished floor.
- C. Orient outlet boxes for vertical installation of devices unless otherwise indicated.

**END OF SECTION**

**SECTION 27 10 00**  
**STRUCTURED CABLING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Communications pathways.
- B. Copper cable and terminations.
- C. Communications equipment room fittings.
- D. Communications outlets.
- E. Communications grounding and bonding.
- F. Communications identification.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 26 00 01 - Basic Materials and Methods.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
  - 1. Includes intersystem bonding termination.
  - 2. Includes bonding jumpers for bonding of communications systems and electrical system grounding.
- D. Section 26 05 37 - Boxes for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products.
- F. Section 26 27 26 - Wiring Devices.
- G. Section 27 05 28 - Pathways for Low-Voltage Systems Cabling
- H. Section 27 05 29 - Hangers and Supports for Communications Systems.

**1.03 REFERENCE STANDARDS**

- A. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition 2019.
- B. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment 2005e.
- C. FM (AG) - FM Approval Guide Current Edition.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set 2020.
- F. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards 2018d, with Addenda (2020).
- G. TIA-569 - Telecommunications Pathways and Spaces 2019e.
- H. TIA-606 - Administration Standard for Telecommunications Infrastructure 2021d.
- I. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises 2019d.

- J. UL (DIR) - Online Certifications Directory Current Edition.
- K. UL 444 - Communications Cables Current Edition, Including All Revisions.
- L. UL 1863 - Communications-Circuit Accessories Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
  - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
  - 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Arrange for Communications Service Provider to provide service.
- C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Sustainable Design Documentation: Submit manufacturer's product data on cable and cable insulation showing compliance with specified lead content requirements.
- D. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
- E. Evidence of qualifications for installer.
- 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. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.
- H. Field Test Reports.
- I. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
  - 1. Record actual locations of outlet boxes and distribution frames.
  - 2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.

3. Identify distribution frames and equipment rooms by room number on drawings.
- J. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

#### **1.06 QUALITY ASSURANCE**

- A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.
- C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
  1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
  2. Supervisors and installers factory certified by manufacturers of products to be installed.
  3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.
- E. 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. Store products in manufacturer's unopened packaging until ready for installation. In addition, cable must be stored in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees F, the cable to be moved to a heated (50 degrees F minimum) location.
- B. Keep stored products clean and dry. If necessary, cable to be stored off site at the Contractor's expense.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. The Contractor shall provide a system warranty covering the installed cabling system against defects in workmanship, components, and performance, and follow-on support after project completion.
- C. The Contractor shall warrant the cabling system against defects in workmanship for a period of one year from the date of system acceptance. The warranty shall cover all labor and materials necessary to correct a failed portion of the system and to demonstrate performance within the original installation specifications after repairs are accomplished. This warranty shall be

provided at no additional cost to the Owner.

- D. The Contractor shall facilitate a minimum 20-year system performance warranty between the manufacturer and the Owner. An extended component warranty shall be provided which warrants functionality of all components used in the system for a minimum of 20 years from the date of acceptance. The performance warranty shall warrant the installed 250 MHz horizontal copper cabling system. Copper links shall be warranted against the link performance minimum expected results defined in ANSI/TIA/EIA-568-B.2-1 (latest draft).
- E. The Contractor shall furnish an hourly rate with the proposal submittal which shall be valid for a period of one year from the date of acceptance. This rate will be used when cabling support is required to affect moves, adds, and changes to the system (MACs). MACs shall not void the Contractor's nor manufacturer's warranty.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. These specifications use a single manufacturer's name, model, or catalog number herein for the purpose of establishing a product set. An equivalent for the specified product set may be used upon approval by the architect or engineer of record.
- B. Basis of Design: Products as manufactured by Commscope: [www.commscope.com](http://www.commscope.com).
- C. Approved Manufacturers:
  - 1. Leviton: [www.leviton.com](http://www.leviton.com).
  - 2. Panduit/General Cable: [www.pangensolutions.com](http://www.pangensolutions.com).

### **2.02 SYSTEM DESIGN**

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including conduits and wireways, pull wires, support structures, enclosures and cabinets, rough-in boxes, conduit sleeves, and terminators.
  - 1. Comply with TIA/EIA-568 and TIA/EIA-569, latest editions.
  - 2. Comply with TIA-570, latest edition.
  - 3. Provide fixed cables and pathways that comply with NFPA 70 and ANSI/J-STD-607 and are UL listed.
  - 4. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
  - 5. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
  - 6. Capacity: As required to terminate all cables plus minimum 25 percent space space.

### **2.03 PATHWAYS**

- A. Conduit: See section 27 05 28 - Pathways for Low Voltage Systems Cabling.



## 2.04 COPPER CABLE AND TERMINATIONS

- A. Copper Horizontal Cable:
1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
  2. Cable Type - Voice and Data: TIA-568.2 Category 6 UTP (unshielded twisted pair); 23 AWG.
  3. Cable Capacity: 4-pair.
  4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
  5. Cable Applications:
    - a. Plenum Applications: Use listed NFPA 70 Type CMP plenum cable.
    - b. Riser Applications: Use listed NFPA 70 Type CMR riser cable or Type CMP plenum cable.
    - c. General Purpose Applications: Use listed NFPA 70 Type CM/CMG general purpose cable, Type CMR riser cable, or Type CMP plenum cable.
  6. Cable Jacket Color - Voice and Data Cable: Blue.
  7. Product(s):
    - a. CommScope; SYSTIMAX Twisted Pair Cables; GigaSPEED XL Category 6 U/UTP Cable: [www.commscope.com/#sle](http://www.commscope.com/#sle).
- B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
1. Performance: 500 mating cycles.
  2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.
  3. Product(s):
    - a. CommScope; SYSTIMAX RJ45 Jacks; MGS400 Series Category 6 U/UTP Modular Jacks: [www.commscope.com/#sle](http://www.commscope.com/#sle).
- D. Copper Patch Cords:
1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.
  2. Patch Cords for Patch Panels:
    - a. Quantity: One for each pair of patch panel ports.
    - b. Length: 5 feet.
  3. Patch Cords for Work Areas:

- a. Quantity: One for each outlet port.
- b. Length: 10 feet.
4. Product(s):
  - a. CommScope; SYSTIMAX Category 6 U/UTP Patch Cords:  
[www.commscope.com/#sle](http://www.commscope.com/#sle).

## 2.05 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- A. Copper Cross-Connection Equipment:
  1. Manufacturers:
    - a. CommScope: [www.commscope.com/#sle](http://www.commscope.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
    - a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
    - b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
    - c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
    - d. Provide incoming cable strain relief and routing guides on back of panel.
  3. Product(s):
    - a. CommScope; SYSTIMAX Copper Panels; 360-IPR-1100-XX Series Patch Panels:  
[www.commscope.com/#sle](http://www.commscope.com/#sle).
- B. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
  1. Size: As indicated on drawings.
  2. Do not paint over UL label.
- C. Equipment Frames, Racks and Cabinets:
  1. Manufacturers:
    - a. Chatsworth, Inc.: [www.chatsworth.com](http://www.chatsworth.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Wall Mounted Cabinets: Front doors with locks, louvered side panels, top and bottom cable access, and ground lug.
    - a. Cover inside of cabinet back with plywood backboard.
    - b. Load Rating: 300 pounds.
    - c. Roof mounted fan, capacity 120cfm.
    - d. Duplex AC power outlet inside cabinet.
  3. Cabinets: Steel construction with corrosion resistant finish 24"W X 24"H x 24"D.

4. Locks: Keyed alike.
5. Product(s):
  - a. Chatsworth #11900-724.

D. Cable Management:

1. Manufacturers:
  - a. Chatsworth: www.chatsworth.com.
  - b. Substitutions: See Section 01 60 00 - Product Requirements.
2. Product(s):
  - a. Vertical Cable Management, provide sufficient quantity to support cables: Chatsworth #40970-704.

## 2.06 COMMUNICATIONS OUTLETS

A. Faceplates:

1. 4 port angled faceplate constructed of ABS molding compound. Each port shall be provided with an icon to indicate its function. Faceplate shall accommodate two labels and provide a clear polycarbonate cover for each. All unused port positions shall have a blank insert installed. Faceplate ports shall be populated left to right, top to bottom.
2. Color: White.
3. CAT 6.
4. Manufacturer: Commscope #M14AS.

B. Standard Configurations:

1. Unless otherwise noted, all locations shall be provided with 2 Category 6 UTP cables terminated on Category 6 modular RJ-45 jacks.
2. Wireless Access Point:
  - a. Located at inaccessible ceilings or shown on wall: Provide outlet junction box with 1 - Category 6 modular jack and faceplate capable of supporting up to two jacks.
3. Projector or Large Format Display (LFD) Outlet:
  - a. 2 - Category 6 UTP cable terminated on Category 6 modular RJ-45 jacks. See drawings for outlet box information.

## PART 3 EXECUTION

### 3.01 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), BICSI N1, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. Comply with latest editions and addenda of TIA-570, TIA-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- C. Comply with Communication Service Provider requirements.

- D. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.
- E. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

### **3.02 INSTALLATION OF EQUIPMENT AND CABLING**

- A. Cabling:
  - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
  - 2. Do not over-cinch or crush cables.
  - 3. Do not exceed manufacturer's recommended cable pull tension.
  - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
  - 1. At Distribution Frames: 120 inches.
  - 2. At Outlets - Copper: 12 inches.
- C. Copper Cabling:
  - 1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
  - 2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
  - 3. Use T568B wiring configuration.
- D. Wall-Mounted Racks and Enclosures:
  - 1. Install to plywood backboards only, unless otherwise indicated.
  - 2. Unless otherwise noted, Mount so height of topmost panel does not exceed 78 inches above floor.
- E. Identification:
  - 1. Use wire and cable markers to identify cables at each end.
  - 2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
  - 3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Comply with inspection and testing requirements of specified installation standards.
- C. Visual Inspection:
  - 1. Inspect cable jackets for certification markings.
  - 2. Inspect cable terminations for color coded labels of proper type.

3. Inspect outlet plates and patch panels for complete labels.
  4. Inspect patch cords for complete labels.
- D. Testing - Copper Cabling and Associated Equipment:
1. Test operation of shorting bars in connection blocks.
  2. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
  3. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.

**END OF SECTION**

**SECTION 31 11 00  
SITE PREPARATION**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. Survey
  - 1. Metes and bounds and topographical data as shown is based on a survey by Butler Surveying, Inc.
- E. See Section 31 22 00 for Grading.
- F. See Section 31 25 00 for Erosion and Sedimentation Control.
- G. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to perform the following work:
  - 1. Clearing and grubbing
  - 2. Topsoil stripping and removal

**1.03 DEFINITIONS**

- A. Site - Owner's entire property on which improvements are to be constructed and as shown on the Site Plan.
- B. Finish Grade - Elevation of finished surface of planting soil.
- C. Topsoil - Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade - Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath topsoil.
- E. AHJ – Authority Having Jurisdiction

**1.04 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

**1.05 PROJECT CONDITIONS**

- A. Traffic

1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.
- B. Utilities Locate
  1. Contractor shall call for utility locator service for the project area prior to any grading, excavation or utility work.
- C. State and local code requirements shall control disposal of debris, which shall be at an approved off-site location.

#### **1.06 SALVAGE**

- A. Refer to Section 02 40 00 Demolition.
- B. Items not designated for salvage or removal by the Owner shall become the contractor's property for his/her removal and legal salvage.

#### **1.07 RECYCLING**

- A. The owner encourages voluntary Contractor participation in recycling programs for any appropriate materials generated by demolition/site preparation activities.

### **PART 2 PRODUCTS**

#### **2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. For each item specified in Part 2 (except native materials), submit the following for approval prior to delivery:
  1. Gradation test reports per ASTM D421 and D422.
- C. Submittals shall be labeled so as to identify for which product(s) the Contractor is seeking approval. **Unlabeled or unorganized submittals will be returned unreviewed.**

#### **2.02 MATERIALS**

- A. Erosion Control
  1. See Section 31 25 00 Erosion and Sedimentation Control.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Layout
  1. Accept site for development "as-is".
  2. Locate existing utilities on and adjacent to the project site.

#### **3.02 CONSTRUCTION REQUIREMENTS**

- A. Dust Control and Debris Removal
  1. Take all necessary and required precautions in controlling dust generated from the construction activities.
  2. Control and protect all drain systems from contamination by run-off from silt-laden water.
  3. Debris from work activities shall be disposed of legally at an approved off-site facility.
- B. Temporary Erosion and Sedimentation Control
  1. Refer to Section 31 25 00, Erosion and Sedimentation Control, for requirements.

2. Refer to the Drawings for plan and details.

C. Clearing and Grubbing

1. Clear site of brush, saplings, trees (and all stumps), rotten wood, rubbish, boulders, and other debris.
2. Grubbing shall be as necessary to remove roots, vegetable matter, large rocks, boulders, and other organic materials.
3. Do not allow cleared materials and debris resulting from clearing and grubbing to accumulate or become buried on site.
4. Remove all cleared and grubbed materials from site, and legally dispose off Owner's property.

D. Topsoil Stripping

1. Re-use of Existing Topsoil (if allowed by the landscape specifications)
  - a. Refer to landscape specifications for requirements regarding potential re-use of existing site topsoil.
  - b. If stockpiling topsoil for future use, refer to landscape specifications for required preparatory work prior to stripping and stockpiling topsoil. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil.
  - c. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
2. Topsoil not re-used on-site shall be disposed of by the Contractor at his expense at an approved off-site location in accordance with all federal, state, and local regulations.

**3.03 PROTECTION**

A. General

1. Protect existing adjacent property from damage during work under this Contract.
2. Existing fences in adjoining areas to be cleared and grubbed that may be damaged or disturbed by such operations shall be carefully removed and then re-installed after earthwork operations.
3. Do not store equipment nor materials adjacent to trees (under area of branch/limb overhang).

END OF SECTION



**SECTION 31 22 00  
GRADING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report(s)
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. See Section 31 11 00 for Site Preparation.
- E. See Section 31 23 19 for Dewatering.
- F. See Section 31 25 00 for Erosion and Sedimentation Control.
- G. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to perform excavation, filling, grading, and compaction in accordance with this Specification and to the extent shown on the Drawings.
  - 1. Preparing subgrades
  - 2. Excavating, backfilling and compacting
  - 3. Drainage and granular base for concrete slabs
  - 4. Base course for concrete and asphalt paving
  - 5. Borrow pits for the purpose of extracting gravel are not allowed.
- B. Except as noted in the plans and Contract Drawings, removing from site and disposing of all debris, excess and unsuitable material from earthwork operations.
- C. Providing imported materials.
- D. Sheeting, shoring, pumping and dewatering, and temporary drainage operations related to earthwork and/or excavation activities.
- E. Fine grading and excavations for all construction not specifically excluded from this section.

**1.03 DEFINITIONS**

- A. Site - Owner's entire property on which improvements are to be constructed and as shown on the Site Plan.
- B. Finish Grade - Elevation of finished surface of planting soil.
- C. Topsoil - Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

- D. Subgrade - Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath topsoil.
- E. Proof Roll - Where proof roll is required on the plans in lieu of density testing, the material shall be compacted to a non-yielding state as approved by the geotechnical engineer. Non-yielding state shall be confirmed with proof rolls using a fully loaded dump truck or approved equal as determined by the geotechnical engineer.
- F. AHJ – Authority Having Jurisdiction

#### **1.04 STANDARD SPECIFICATION**

- A. Standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. Reference specification shall be the latest edition of the International Building Code (IBC), with its revisions and supplements.
- C. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.
- D. For work to be performed on-site, the requirements of this section shall apply.

#### **1.05 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

#### **1.06 PROJECT CONDITIONS**

- A. Traffic
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.
- B. Utilities Locate
  - 1. Contractor shall call for utility locator service for the project area prior to any grading, excavation or utility work.
- C. State and local code requirements shall control disposal of debris, which shall be at an approved off-site location.

### **PART 2 PRODUCTS**

#### **2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. For each item specified in Part 2 (except native materials), submit the following for approval prior to delivery:
  - 1. Gradation test reports per ASTM D421 and D422.
- C. Submittals shall be labeled so as to identify for which product(s) the Contractor is seeking approval. **Unlabeled or unorganized submittals will be returned unreviewed.**

#### **2.02 MATERIALS**

- A. Erosion Control
  - 1. See Section 31 25 00 Erosion and Sedimentation Control.

B. Topsoil

1. Refer to the landscape specifications for all topsoil requirements, including information regarding potential re-use of existing native topsoil material as project topsoil. If allowed, the existing material will likely require preparation and amendments. Agricultural Soil Composition Analyses have been performed and are available.

C. Native Soils

1. Dry weather fill
  - a. Existing native site materials may be utilized for structural fills, provided that the materials are free from organics, deleterious material and oversize material (greater than 6" diameter). The soil moisture content shall be within two percentage points of optimum conditions.
2. Wet weather fill
  - a. Existing native site materials may not be suitable for structural fills in wet weather. If native materials are used for structural fills, the Contractor shall be aware that aeration of the native material or other techniques may be required in order to achieve the recommended compaction criteria during wet weather construction.

D. Controlled Density Fills

1. The use of Controlled Density Fills, (CDF), a sand, cement and water slurry capable of attaining over 100 psi has proven to be an efficient method of backfill. Where compaction requirements around utilities or tight structure is necessary, CDF may be a cost effective alternate to mechanically compacted fills.

E. Crushed Rock

1. All crushed rock shall be manufactured from ledge rock, talus or gravel, uniform in quality and substantially free from wood, bark and other extraneous materials.
2. Round rock (from alluvial quarries) shall not be acceptable for structural fills or crushed surfacing. If used for drain rock, it shall still have fractured faces.
3. Crushed Surfacing
  - a. C.S.T.C. shall mean Crushed Surfacing Top Course per Section 9-03.9(3) of the Standard Specifications.
  - b. C.S.B.C. shall mean Crushed Surfacing Base Course per Section 9-03.9(3) of the Standard Specifications.
4. Drain Rock/Gravel Backfill for Drywells/Infiltration Trenches
  - a. Gravel backfill for drywells shall meet the requirements of Section 9-03.12(5) of the Standard Specifications.
5. Structural Slab Base Rock
  - a. Structural Slab Top Course shall meet the requirements of Crushed Surfacing Top Course per Section 9-03.9(3) of the WSDOT Standard Specifications.
  - b. Structural Slab Base Course shall meet the requirements of Crushed Surfacing Base Course per Section 9-03.9(3) of the WSDOT Standard Specifications.

F. Utility Trenches

1. Refer to Section 31 23 33 Trenching, Backfilling, and Compacting for bedding and backfill material requirements.

G. Water Quality Treatment Soil

1. Refer to Section 33 41 14 Storm Drainage

H. Imported Structural Fill

1. Within Building Footprint (or within 2H:1V zone of influence from bottom of foundation)
  - a. All-weather granular material only.
  - b. Imported structural fills shall be crushed or partially crushed granular material of pit run rock, quarry run rock, crushed rock or crushed gravel and sand, generally well-graded. Maximum particle size shall be three inches in any dimension.
  - c. Products
    - 1) Imported structural fill may be crushed surfacing meeting the requirements of Section 9-03.9(3) of the Standard Specifications.
    - 2) Ballast
      - a) Imported structural fill may be ballast meeting the requirements of Section 9-03.9(1) of the Standard Specifications.
      - b) If ballast is used, the depth of fill allowed will be limited in the field by the geotechnical engineer based on the open graded nature of the material. A choker course will be required prior to the CTB.
    - 3) Approved equal.
2. Outside Building Footprint (and zone of influence)
  - a. Any material approved for use as structural fill within the building footprint.
  - b. Borrow
    - 1) General imported soil may be utilized for structural fills, provided that the materials is free from organics, deleterious material, oversize material (greater than 6" diameter), and can achieve the specified compaction.
    - 2) The soil moisture content shall be within two percentage points of optimum conditions. If an all-weather granular material is not selected, the contractor shall be aware that significant efforts may be required to aerate, farm, and/or otherwise work the material in order to obtain proper moisture content and compaction.
    - 3) Material shall meet the requirement for Common Borrow per Section 9-03.14(3) of the Standard Specifications.

I. Use of Recycled Materials for Fill

1. The owner takes no exception to incorporating recycled concrete, asphalt, masonry block or brick into embankment structural fills provided the recycled material meets the following specifications:
  - a. It shall be inert and free of rebar and other deleterious and objectionable matter as defined by WSDOT.
  - b. It shall be pulverized, crushed, or otherwise processed to meet the gradation specification identified in WSDOT Section 9-03.14(2) Select Borrow.
  - c. It shall be mixed and blended uniformly with naturally occurring soils and aggregates at a ratio of no greater than 1 part recycled materials to 1 part soil/aggregate.

- d. Recycled materials shall not be used in embankment fills within 2 feet (vertical or horizontal) of the bottom of structures, foundations, slabs, pavements, or any other structural facilities.

### **PART 3 EXECUTION**

#### **3.01 WEATHER LIMITATIONS**

- A. The Contractor shall be advised that existing near surface site soils can be moisture sensitive, and therefore subgrade preparation during wet or wintertime construction may require additional efforts and/or materials.
- B. The Contractor shall be advised that wet weather construction requires separate methods and techniques, and often requires additional materials. Refer to project geotechnical report for wet weather construction recommendations.
- C. Section depths indicated on the Drawings under asphalt pavements, building slabs, and other locations are designed for dry weather construction. Depths may be required to be increased if placed during wet weather and shall be at the contractor's expense.
- D. Contractor shall be responsible for providing granular working blankets and imported structural fill as needed for haul road(s). Actual extent of granular material shall be determined by the Contractor. All additional granular material required to accommodate wet weather construction shall be at the Contractor's expense.
- E. Construction traffic on saturated soils can result in over compaction. Soils that have been disturbed by construction activities shall be excavated and re-placed to proper compaction specifications.
- F. Restrictions for excavation and fill operations during inclement weather include, but are not limited to:
  1. Do not backfill or construct fills or embankments during freezing weather.
  2. Do not place backfill or construct fills or embankments on frozen surfaces.
  3. Do not place frozen materials, snow or ice in backfill or embankment.
  4. Do not deposit, tamp, roll or otherwise mechanically compact backfill in water.

#### **3.02 PREPARATION**

- A. Layout
  1. Accept site for development "as-is".
  2. Employ and pay for professional, licensed surveyor to verify existing contours, elevations and to lay out the work as required.
  3. Locate and work from existing monuments, and benchmarks.
  4. Locate existing utilities on and adjacent to the project site.
  5. Mark proposed sawcut lines and protect existing asphalt areas to remain.
- B. Preparation of site for excavation and fill operations shall include but not be limited to; stripping, inspection of existing fills, dewatering, shoring, proof-rolling, and aerating or adding water to provide for optimum moisture.

- C. Contractor shall use all means necessary to control dust on and near the work site if such dust is caused by the Contractor's operations during the performance of the work or as a result of same.
- D. Excavate to the necessary depth to remove all organic or unsuitable material.

### **3.03 CONSTRUCTION REQUIREMENTS**

- A. Temporary Erosion and Sedimentation Control
  - 1. See Section 31 25 00, Erosion and Sedimentation Control, for additional requirements.
  - 2. Refer to the Drawings for plan and details.
- D. Grading
  - 1. Excess Earth Disposal
    - a. Contractor may place native material that is deemed suitable in accordance with the Contract Documents.
    - b. Contractor must dispose of all excess earth from excavation off-site in a legal fashion.
    - c. Unsuitable material must be disposed of off-site in a legal fashion.
    - d. Contractor shall comply with all applicable Washington State Laws when hauling.
    - e. The Contractor shall be responsible for removal from roadways any mud or debris which is tracked onto the road by earth hauling operations.
    - f. The contractor shall provide erosion control as shown on the Drawings and required by the local codes and regulations. This includes but is not limited to truck wash off mats, storm drain protection, silt fencing and related measures.
    - g. The Contractor must obtain all necessary permits from the appropriate jurisdiction as required for hauling that will occur over city, county and state streets, roads and highways.
  - 2. Underground Obstructions
    - a. Existing utilities as shown on the Drawings are a best effort compilation of a "Utilities Locate" surface locations and As-Built drawings. The contractor shall verify locations and elevations of all existing utilities prior to construction.
    - b. The Contractor is to call the Utility Notification Center 48 hours prior to commencing excavation activities.
    - c. The Contractor shall immediately notify the Project Manager and Owner's Representative in the event an underground obstruction or uncharted utility is encountered.
    - d. The Contractor shall expose and verify size, location and elevation of underground utilities and structures where conflicts might exist. This work shall be done sufficiently in advance to permit changes in the event of conflict without affecting the project schedule.
    - e. The Contractor is responsible for all costs for damage to utilities shown on the drawings or identified by location service.
  - 3. Drainage and Groundwater Control
    - a. Dewatering shall meet the requirements noted in Section 31 23 19 Dewatering.

- b. The Contractor shall maintain excavations and trenches free from water during construction.
  - c. The Contractor shall remove water encountered in the trenches to the extent necessary to provide a firm subgrade, to permit joints to be made in the dry, and to prevent the entrance of water into any pipeline or conduit.
  - d. Contractor shall divert surface runoff and use sumps, gravel blankets, well points, drain lines, bypass pumping or other means necessary to accomplish the above.
  - e. Contractor shall maintain the excavation or trenches free from water until the structure, or pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.
4. It shall be the Contractor's responsibility to verify overall cut and fill quantities required to meet the grades, details and intent shown on the drawings. Allow for structural pavement sections, trench spoils, and similar items and activities that affect overall earthwork quantities. If additional material is required to be imported, or excess material is required to be hauled off-site, it shall be at the Contractor's expense.
- a. Compact materials in accordance with the Geotechnical Report. Unless otherwise noted on the Drawings, compact to the densities indicated in the Geotechnical Report.
  - b. Coordinate with Owner's inspector for inspections. Obtain approvals prior to proceeding with succeeding lifts.
    - 1) Inspection of grubbed and stripped surfaces before grading operations.
    - 2) Inspection of cut areas to detect presence of unsuitable soil areas.
    - 3) Inspection of each lift of fill materials before proceeding with succeeding lifts.
    - 4) Inspection and approval of off-site materials.
    - 5) Inspection and compaction tests for compaction.
5. Areas identified for grading or other construction activities shall first be stripped of topsoil, roots, unsuitable fills, etc., i.e. excavated to non-organic, native undisturbed surface, engineered structural fill, or existing undocumented fill provided it is firm, competent, and exhibits density and index properties consistent with those observed during the geotechnical investigation.
6. Uniformly grade areas to a smooth surface, free from irregular surface changes, to bring site to elevations and contours shown in drawings.
7. Proof roll subgrades, before filling or placing aggregate courses, with heavy pneumatic-tired equipment to identify unsuitable soil areas and areas of excess yielding. Do not proof roll wet or saturated subgrades, see geotechnical report for wet weather construction.
8. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.
9. Remove unsuitable soils and replace with suitable fill as directed by Engineer.
10. Under Concrete Slabs-on-Grade
- a. Place granular base (see Interior Concrete Slab) on prepared underslab fill. Compact to required sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D1557.
11. Structural Fill

- a. See materials requirements in Part 2 of this section
  - b. Native Soils
    - 1) Place in loose lifts not exceeding 12 inches in depth and compact each lift to not less than 95 percent of maximum dry density, as determined by ASTM D1557. The soil moisture shall be within two percentage points of optimum conditions.
  - c. Imported
    - 1) Place in maximum 12-inch deep lifts and compact each lift to not less than 95 percent of maximum dry density, as determined by ASTM D1557.
- E. ADA Ramps
1. ADA ramps shall meet current ADA requirements, including the following:
    - a. Longitudinal slope no greater than 1 unit of rise in 12 units of run in the direction of travel.
    - b. Cross slope no greater than 1 unit of rise in 48 units of run.
    - c. On private property, ramp length shall not be greater than 6-feet without handrail.
      - 1) Ramp design shall not be changed in the field without written approval by the project civil engineer. Any ramp that is changed without permission is subject to rejection.

### **3.04 QUALITY ASSURANCE**

- A. The Contractor is responsible for project quality control in ensuring that the project is constructed per the Drawings and specifications.
- B. Engineering Control
  1. Personnel from an independent testing and inspection laboratory will assist the Engineer as Owner's representative at the site. Earthwork operations are subject to inspections and approvals.
  2. Intermittent, rather than continuous, inspections are anticipated.
  3. Contractor shall inform the Engineer and Inspectors of schedules so that inspections can be made at appropriate times.
  4. Unapproved earthwork buried by fills prior to approvals is subject to rejection. Any fill that does not meet Specification requirements is subject to removal, replacement, and re-compaction at Engineer's discretion.
- C. The Owner is responsible for project quality assurance, to the satisfaction of the Owner. The Owner may retain a Testing Agency to perform on site observation and testing during the following phases of the construction operations. The services of the Testing Agency may include, but are not limited to, the following:
  1. Observation of compaction of subgrades.
  2. Observation during placement and compaction of material.
  3. Observation of subgrade preparation for field and paved areas.
  4. Observation during placement and compaction of backfill utility trenches.
  5. Observation of over-excavations (both defined and unforeseen), including approval of bottom of over-ex.



6. Laboratory testing and analysis of fill and bedding materials specified, as required.
  7. Observe construction and perform water content, gradation, and compaction tests at a frequency and at locations determined by the Geotechnical Consultant. The results of these tests will be submitted to the Owner and Engineer, a copy to the Contractor, on a timely basis so that the Contractor can take such action as is required to remedy indicated deficiencies. During the course of construction, the Testing Agency will advise the Owner and Engineer in writing with copy to Contractor if, at any time, in his opinion, the work is not in substantial conformity with the Contract Documents.
  8. Observation of fills following interruptions by rains or other inclement weather.
- D. Neither the presence of the Geotechnical Consultant, nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.
- E. The Owner reserves the right to modify or waive Testing Agency services.
- F. Payment for initial material testing shall be the responsibility of the Owner. Costs for any test(s) which must be repeated on materials that have failed to meet specifications shall be the responsibility of the Contractor.

### **3.05 REPAIR**

- A. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.
- B. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact and perform surface restoration.
- C. Remove surplus soil, trash, debris and other material and legally dispose at the Contractor's expense at an approved facility in accordance with all federal, state and local regulations

### **3.06 PROTECTION**

- A. General
  1. Protect existing adjacent property from damage during work under this Contract.
  2. Protect existing trees shown to remain. Keep trees intact and root balls free from disruption. Any trees damaged shall be replaced with like species and size.
  3. Existing fences in adjoining areas to be cleared and grubbed that may be damaged or disturbed by such operations shall be carefully removed, reserved and re-installed after earthwork operations.
  4. Do not store equipment or materials adjacent to trees (under area of branch/limb overhang).
  5. Mark proposed sawcut lines and protect existing asphalt areas to remain.
- B. The Contractor shall be responsible for maintaining correct backfill, fill and embankment settlement and make necessary repairs to pavement, sidewalks or other structures which may be damaged as a result of settlement.
- C. Protect newly graded areas from traffic, and erosion. Keep free of trash and debris.
- D. Tree Protection
  1. Except when excavating directly adjacent to existing trees, erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.

2. When excavating within the drip line of existing trees, use extreme caution so as to not damage existing tree roots.
3. When roots are encountered, use hand-held non powered equipment to complete excavation work. The owner or engineer shall observe any exposed roots and determine limits of potential removal. Do not rip or tear existing tree roots. Any roots to be removed shall be cut with a saw after approval by the owner or their representative.

END OF SECTION

**SECTION 31 23 19  
DEWATERING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report(s)
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. See Section 31 25 00 for Erosion and Sedimentation Control.
- E. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to design, furnish, install, operate, monitor, modify, and remove site dewatering system(s) as needed to keep open trenches and excavations free from water and hydrostatic pressure, in accordance with local, state and federal requirements.
- B. Dewatering activities are generally understood to include the following:
  - 1. Diversion of surface water runoff around open trenches and excavations.
  - 2. Removal of groundwater as needed to keep open trenches and excavations free from water and hydrostatic pressure, and to accommodate proper construction.
- C. The extent of dewatering will depend on actual site conditions, contractor means and methods, the location of the work on the site, the time of year, and other factors. Based on the existence of favorable site soils and deep groundwater levels, the need for significant dewatering work is generally not anticipated. However, the need for dewatering is still possible based on the following hypothetical conditions:
  - 1. Pockets of high or perched groundwater due to mismapped soils.
  - 2. Overcompacted near-surface site soils as result of prior site development activity.
  - 3. As described in the project geotechnical report, the soils observed within onsite explorations generally consisted of gravelly soil profile.
  - 4. Extreme weather conditions.
  - 5. Other conditions resulting in the need for dewatering.
- D. All elements of the dewatering work are the responsibility of the contractor, including but not limited to:
  - 1. Identification of need.
  - 2. Design, furnishing, installation, operation, monitoring, modifications, and removal of site dewatering system(s).
  - 3. Any required permit associated with dewatering system (i.e. temporary wells, etc.).

4. Proper discharge of dewatered volume, with treatment if required.
5. Conformance with local, state, and federal regulations.

### **1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

### **1.04 STANDARD SPECIFICATION**

- A. Standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.

### **1.05 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

## **PART 2 NOT USED**

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Site dewatering system(s) shall be employed as needed to meet the following criteria:
  1. Diversion of surface water runoff around open trenches and excavations.
  2. Removal of groundwater as needed to keep open trenches and excavations free from water and hydrostatic pressure, and to accommodate proper construction.
- B. Contractor is responsible for investigating and becoming familiar with all site conditions which may affect the extent of dewatering work required to accommodate construction, including groundwater elevations, soils information, topography, surface water features, construction schedule, and other factors.
- C. Contractor's responsibility for water management shall be continuous throughout the entire contract. Suspension of dewatering work for weekends, holidays, and work stoppages shall not be an acceptable rationale for damage, delay, or adding time to the contract.
- D. Dewatered volumes shall be treated (prior to discharge) if required by federal, state, and/or local requirements.
- E. Do not block natural drainage courses that may be needed for passage of large storm events.
- F. Dewatering discharge flows shall not cause erosion or flooding, or alter flow paths.
- G. Contractor shall remove all elements of the dewatering system prior to completion of the project. Any excavations utilized for dewatering shall be properly backfilled and compacted (observed by the project geotechnical engineer).

### **3.02 CONSTRUCTION REQUIREMENTS**

- A. Damages
  1. Dewatering work shall be performed in such a manner that surface and subsurface drainage patterns of adjacent properties are not affected.
  2. The Contractor shall be responsible for and shall repair without cost to the Owner any damage caused by heave, soil loss, removal of material, pumping from the excavated area, negligence, inadequate or improper installation of the temporary dewatering system, inadequate maintenance and operation of temporary dewatering system, and any mechanical or electrical failure of temporary dewatering system.

END OF SECTION

**SECTION 31 23 33  
TRENCHING, BACKFILLING, AND COMPACTING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report(s)
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. See Section 31 25 00 for Erosion and Sedimentation Control.
- E. See Section 31 23 19 for Dewatering.
- F. Where conflicts exist, the bedding and backfill requirements stated in the following sections shall take precedence over the requirements in this section:
  - 1. Section 33 11 13 Water System
  - 2. Section 33 31 13 Sanitary Sewer
  - 3. Section 33 41 14 Storm Drainage
- G. Where conflict exists between the Drawings and the Specifications, the bedding and backfill requirements on the Drawings shall take precedence over the requirements in the Specifications.
- H. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to perform all trenching, shoring, foundation preparation, backfilling and compaction required to accomplish site utility and conduit installation work.

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 STANDARD SPECIFICATION**

- A. Standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. Reference specification shall be the latest edition of the International Building Code (IBC), with its revisions and supplements.
- C. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.
- D. For work to be performed on-site, the requirements of this section shall apply.

**1.05 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

**1.06 PROJECT CONDITIONS**

- A. Traffic
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.
- B. Utilities Locate
  - 1. Contractor shall call for utility locator service for the project area prior to any grading, excavation or utility work.
- C. State and local code requirements shall control disposal of debris, which shall be at an approved off-site location.

**PART 2 PRODUCTS**

**2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. Gradation test reports per ASTM D421 and D422.
- C. Moisture density test reports per ASTM D-1557, Method D.
- D. Submittals shall be labeled so as to identify for which product(s) the Contractor is seeking approval. **Unlabeled or unorganized submittals will be returned unreviewed.**

**2.02 MATERIALS**

- A. Unless otherwise noted on the Contract Drawings or specifically mandated by the utility purveyor, bedding and backfill for utility trench excavations shall meet the following requirements:
  - 1. Pipe Bedding
    - a. Bedding Material for Rigid Pipe:
      - 1) Gravel backfill for pipe bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<b>US Sieve Size</b>	<b>Percent Passing</b>
1"	100
1/4"	25-80
#200	10 Maximum
Sand Equivalent	35 Minimum
All percentages are by weight.	

- b. Bedding Material for Flexible Pipe:
          - 1) Bedding material for flexible pipe shall be clean sand/gravel mixture free from organic matter and conforming to the following gradation:

US Sieve Size	Percent Passing
3/4"	100
3/8"	70-100
#4	55-100
#10	35-95
#20	20-80
#40	10-55
#100	0-10
#200	0-3
All percentages are by weight.	

2. Trench Backfill
  - a. Granular (areas under or within 5' of paved surfaces): Section 9-03.12(4) Gravel Backfill for Drains
  - b. Native (areas more than 5' from paved surfaces): Section 9-03.15 Native Material for Trench Backfill

### **PART 3 EXECUTION**

#### **3.01 GENERAL**

- A. All pipe and conduit shall be bedded.
- B. Imported Backfill Material shall be placed in maximum 8-inch lifts with each lift compacted to 95 percent maximum dry density per ASTM D1557. Dispose of excess material from the trench off-site in accordance with all applicable state and local regulations.
- C. Work shall be performed per the requirements of Section 7-08.
- D. All trench backfill shall be compacted, including infiltration trenches.

#### **3.02 CONSTRUCTION REQUIREMENTS**

- A. Drainage and Groundwater Control
  1. Dewatering shall meet the requirements noted in Section 31 23 19 (Dewatering).
  2. The Contractor shall maintain excavations and trenches free from water during construction.
  3. The Contractor shall remove water encountered in the trenches to the extent necessary to provide a firm subgrade, to permit joints to be made in the dry, and to prevent the entrance of water into any pipeline or conduit.
  4. Contractor shall divert surface runoff and use sumps, gravel blankets, well points, drain lines, bypass pumping or other means necessary to accomplish the above.
  5. Contractor shall maintain the excavation or trenches free from water until the structure, or pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.
- B. Sheet piling and Shoring
  1. All excavation and trenching operations are to be conducted in accordance with WAC 296-155 Part N. The contractor shall protect all persons entering and working in excavations and trenches through the use of sloping, shoring and shield systems.



2. Where the stability of adjoining buildings, wall or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures in accordance with WAC 296-155, Part N.
  3. The general public is to be protected from open excavations and trenches by means of barricades and fences clearly marked or identified by flagging or warning signs.
- C. Tracer Wire
1. All non-metallic pipe shall be installed with tracer wire.
- D. Pavement Cuts and Surface Restoration
1. Sawcut
    - a. Trenches through existing pavement or hardscape areas shall be sawcut with a wet machine. Broken or damaged edges shall be re-cut prior to backfill and re-surfacing.
  2. Pavement Restoration
    - a. On-site Private
      - 1) Meet or exceed the pavement sections (pavement over crushed rock) noted on the Contract Drawings. Cold mix asphalt is not permitted except for temporary patches, and shall be removed prior to permanent patch. Sand and seal edges prior to overlay or seal coat.
    - b. Off-site Public
      - 1) Meet the Agency Having Jurisdiction requirements for section depth, trench width, sawcut, and sand and seal requirements.

### **3.03 QUALITY ASSURANCE**

- A. Testing
1. The contractor shall be responsible for coordinating with the owner's certified testing agency to obtain trench compaction tests. The trench compaction tests shall be performed at approximate 250' intervals, with a minimum of one test per trench regardless of trench length. Test locations shall be field determined by the owner's inspector. Test results shall be submitted to the owner within 24 hours.

END OF SECTION

**SECTION 31 25 00**  
**EROSION AND SEDIMENTATION CONTROL**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report(s)
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. See Section 31 23 19 for Dewatering.
- E. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to provide project erosion and sedimentation control (ESC) in accordance with local, state and federal requirements.
- B. Erosion/Sedimentation Control (ESC) is required on this project. Erosion control shall be implemented and maintained in accordance with the Department of Ecology (DOE) standards and regulations. The implementation of the ESC and the construction, maintenance, replacement, and upgrading of these ESC facilities is the responsibility of the Contractor until all construction is completed and approved and the permanent vegetation/landscaping is established.
- C. The ESC facilities shown on this Drawing and/or details must be constructed in conjunction with all rough grading and site utility construction, in such a manner as to ensure that sediment and sediment-laden water do not enter drainage systems, roadways, or permanent stormwater facilities, or violate applicable water standards.
- D. The ESC facilities shown on the Drawings are the minimum requirements for anticipated site conditions. During the construction period, the contractor shall upgrade these ESC facilities as needed for unexpected storm events, site conditions, or construction practices to ensure that sediment and sediment-laden water do not leave the site or enter storm drainage systems.

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 STANDARD SPECIFICATIONS**

- A. Standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.

- C. For work to be performed on-site, the requirements of this section shall apply.

**1.05 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

**1.06 PROJECT CONDITIONS**

- A. Traffic
1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.
- B. Utilities Locate
1. Contractor shall call for utility locator service for the project area prior to any grading, excavation or utility work.
- C. State and local code requirements shall control disposal of debris, which shall be at an approved off-site location.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. See Contract Drawings.
- B. Per AHJ standard erosion control details.

**PART 3 EXECUTION**

**3.01 CONSTRUCTION REQUIREMENTS**

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of AHJ and the sediment and erosion control Drawings.
- B. Erosion control as shown on the Drawings are the base recommendations and are in no way intended to represent all of the potential erosion control measures that may be required during construction. Contractor shall be responsible for grading of temporary cut-off ditches, sedimentation ponds, bladder bags, sumps, Baker Tanks™, bypass pumping, dewatering and other means as required and necessary to control storm water runoff during construction so that no silt-laden water leaves the project site. All such measures shall be at Contractor's expense.
- C. At no time shall more than one foot of sediment be allowed to accumulate within a trapped catch basin. All catch basins and conveyance systems shall be cleaned prior to paving. The cleaning operation shall not flush sediment-laden water into the downstream system.
- D. Stabilized construction entrance(s) will be constructed at the beginning of construction. Locations shall be reviewed and approved by the Owner. These entrance(s) shall be maintained by the contractor of this project for the duration of the project. Additional measures may be required to ensure that all paved areas adjacent to the project are kept clean for the duration of the project.
- E. Sediment fences, bio-bags, and other ESC measures shall be removed when they have served their useful purpose and when approved by the engineer, but not before the upslope area has been permanently stabilized. Upon completion of construction and full site establishment, remove erosion and sedimentation controls and restore and stabilize any areas that are disturbed during removal.

- F. Construction and maintenance of graveled construction entrances, temporary sediment fences, and straw bale sediment barriers, and other erosion control work shall conform to the AHJ's requirements.
- G. All materials shall be in good physical condition to provide proper sediment retention.
- H. Sediment fences and barriers shall be inspected by the contractor immediately after each rainfall and at least daily during prolonged rainfall. Inspect all other ESC facilities daily and provide repair and/or maintenance as necessary to ensure their continued functioning. Any required repairs shall be made immediately.
- I. Silt-laden construction stormwater runoff shall not be conveyed to permanent stormwater treatment, detention, or infiltration facilities until the finished grade surfaces are complete and established.
- J. Stormwater Pollution Prevention Plan (SWPPP)
  - 1. Contractor shall provide a certified CECSL as required for the SWPPP.
  - 2. Any fines resulting from lack of conformance with the requirements of the SWPPP shall be the responsibility of the Contractor.

END OF SECTION

**SECTION 32 12 16  
ASPHALT PAVING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to place rock base, asphalt paving, surface treatments, and appurtenant items as shown on the Drawings.

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 STANDARD SPECIFICATIONS**

- A. Standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. Reference specification shall be the latest edition of the International Building Code (IBC), with its revisions and supplements.
- C. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.
- D. For work to be performed on-site, the requirements of this section shall apply.

**1.05 QUALIFICATIONS**

**1.06 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

**1.07 PROJECT CONDITIONS**

- A. Traffic
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.

**PART 2 PRODUCTS**

## **2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. Submit product receipts and/or truck tickets for material quantity verification, when applicable.

## **2.02 MATERIALS**

- A. Crushed Surfacing
  - 1. C.S.T.C. shall mean Crushed Surfacing Top Course meeting the requirements of Section 9-03.9(3) of the Standard Specifications.
  - 2. C.S.B.C. shall mean Crushed Surfacing Base Course meeting the requirements of Section 9-03.9(3) of the Standard Specifications.
- B. HMA Pavement - Hot Mix Asphalt per Section 5-04 of the Standard Specifications conforming to the requirements and compacted thickness in the Drawings.
- C. Soil Sterilant - Slow release herbicide, Casoron or approved equal. Applied prior to paving in accordance with Section 5-04.3(5)D of the Standard Specifications.

## **PART 3 EXECUTION**

### **3.01 WEATHER LIMITATIONS**

- A. Unless approved by the Project Manager, asphalt concrete shall not be placed when the surface temperature is lower than 45 degrees F.
- B. Asphalt concrete shall not be placed on any wet surface, or when weather conditions otherwise prevent the proper handling or finishing of the bituminous mixture.

### **3.02 PREPARATION**

- A. Subgrade for Surfacing
  - 1. In preparing the area for surfacing, the Contractor shall;
    - a. Remove, immediately before placing paving materials, all brush, weeds, vegetation, grass and other debris.
    - b. Dispose of all debris off-site in a legal manner.
    - c. Drain water from all low spots or ruts.
    - d. Shape the entire sub grade to a uniform surface running reasonably true to the line, grade and cross-section staked by the Contractor.
    - e. If necessary, the Contractor shall process the sub grade in cut areas to remove materials too coarse for mechanical trimming and compaction.
    - f. Compact the sub grade to a depth of 6-inches. Compaction shall achieve 95% of the maximum density as determined by ASTM D-1557. If the underlying material is too soft to permit proper compaction of the sub grade, the Contractor shall loosen, aerate, and compact the sub grade until the top layer can be compacted as required.
    - g. Remove excess material that does not drift to low spots during blading and shaping. The Contractor shall dispose of this excess by placing it where the sub grade lacks material or by disposing off-site.
    - h. Add materials where the sub grade needs more to bring it up to grade. The Contractor shall water and compact these added materials as needed to produce a true finish sub grade.

B. Soil Sterilization

1. Apply soil sterilization in accordance with Section 5-04.3(5)D of the Standard Specifications. Spread weed killer at the rate of four pounds per 100 square feet. Spread evenly and uniformly as directed by manufacturer's instructions.

**3.03 CONSTRUCTION REQUIREMENTS**

A. Pre-Pave Meeting

1. At least two days prior to paving (and preferably one week), the contractor shall attend a pre-pave meeting at the office of the engineer. Attendance of the owner's representative, general contractor, paving subcontractor and paving superintendent is mandatory.
  - a. The paving contractor shall provide the following at the meeting:
    - 1) Paving plan in graphic format for review and discussion.
    - 2) List of proposed equipment, including paving machine, rollers, and other compaction equipment.
    - 3) Estimated start time and forecasted temperature at that start time.
    - 4) Source for asphalt including estimated drive time to site.
    - 5) Proposed product temperature leaving the plant and anticipated temperature upon arrival.
  - b. Each item in Section 3.04(A) will be reviewed.
  - c. At the end of the meeting, the general contractor, paving subcontractor and paving superintendent will be asked to initial, acknowledge, and accept the following items:
    - 1) Diesel will not be used during paving operations, and diesel will not be stored on the paving machine.
    - 2) All equipment will be checked for proper operating condition after delivery to the site and prior to paving. This includes paving machine (and screed), rollers, tack coat distributor and spray nozzles, vibratory plate compactor, and other related equipment.
    - 3) All hydraulic hoses will be checked for leaks and drips the morning of the pave.
    - 4) Paving shall not begin until the surface temperature has met the stated minimum and is rising.
    - 5) Paving shall not begin until an agreed upon start time.
    - 6) Vibratory compaction is prohibited when the surface temperature is less than 170 deg. F.
    - 7) All roller operators shall be supplied with working infrared heat guns.
    - 8) Asphalt joints shall be stacked (no tapers or feathers).
  - d. Pre-Pave Walk
    - 1) The meeting shall conclude with a pre-pave walk. The Contractor, Engineer, paving subcontractor, and earthwork subcontractor shall walk the prepared subgrade. The Contractor shall allow time in the schedule to correct any identified deficiencies.

B. General

1. Lift Thickness
    - a. Provide roller(s) with sufficient weight to compact the mat in accordance with Section 5-04.
  2. Pneumatic tired rollers are not required.
  3. Rollers shall only be operated in static mode when the surface temperature of the mix is 170 degrees F or less.
  4. Provide and employ visquine plastic, blowers, shop-vac, or other means as required and necessary to ensure that there is no standing water on the prepared subgrade.
  5. All loads should be tightly tarped (seal over the sides of the truck bed) with the mix arriving at 300 deg. or better.
  6. The Contractor shall coordinate with the asphalt plant so that haul trucks are not kept waiting to unload into the paver.
  7. The Contractor should dump paving machine wings every truckload or more often in order to prevent small pieces of cooled HMA to drop into the mix.
  8. The Contractor shall have an adequate number of rollers on site to obtain compaction. Consider high capacity rollers, and work the rollers as close to the paving machine as possible.
  9. Keep hand-raking to an absolute minimum.
- C. Equipment Inspection
1. The paving equipment shall be subject to inspection by the owner's representative to ensure quality. Typical items to be inspected include paving machine screeds, roller watering system, and other typical items.
- D. Diesel
1. Diesel shall not be allowed on paving machine during paving operations. Diesel shall not be used near new paving or during paving operations to clean equipment or for any other purpose than as needed to fuel vehicles.
- E. Spreading and Finishing
1. The mixture shall be laid upon an approved surface, spread and struck off to the grade and elevation established. Unless shown otherwise on the Drawings, the nominal compacted depth shall be 2-inches.
- F. Compaction
1. Immediately after the asphalt mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted. The completed course shall be free from ridges, ruts, humps, depressions, objectionable marks, or irregularities and in conformance with the line, grade, and cross-section shown in the Drawings.

### **3.04 QUALITY ASSURANCE**

- A. The Contractor is responsible for project quality control in ensuring that the project is constructed per the Drawings and specifications.
- B. The Owner may retain a Testing Agency to perform on site observation and testing. The services of the Testing Agency may include, but not limited to, the following:
  1. The field density of compacted asphalt concrete shall be determined by a properly calibrated nuclear asphalt testing device.



2. Perform compaction tests at rate of one per 5,000 square feet maximum, for each lift or course of asphalt concrete placed.
3. Testing and inspection of paving shall be conducted in the presence of the Contractor (or representative), and the Project Officer or Designated Facilities Development representative.
4. Certification: Certify in writing that all asphalt concrete paving was installed in accordance with these specifications and the referenced standards.

C. Acceptance

1. Asphalt Paving Repair
  - a. Where testing and inspection indicates non-compliance with specifications, repair or replace all defective asphalt concrete paving, by approved methods, and provide the compaction specified and a finished surface in accordance with the tolerance specified above.

**3.05 TOLERANCE ACCEPTANCE**

A. Surface Smoothness and Tolerance:

1. The completed surface shall be of uniform texture, smooth, uniform as to crown and grade, and free from defects of all kinds.
2. The complete surface shall not vary more than 1/8-inch from the lower edge a 10-foot straight edge in any direction.

**3.06 CLEAN UP**

- A. All dirt, soil, debris, excess materials of any nature shall be removed and disposed of off-site and areas shall present a clean workmanlike appearance.
- B. Remove any overspray or spillage of tack coat, paint, thermoplastic, asphalt, or other material.

END OF SECTION

**SECTION 32 13 13  
CONCRETE PAVING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to place rock base, concrete curb and flatwork, and appurtenant items as shown on the Drawings.

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 STANDARD SPECIFICATION**

- A. Standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. Reference specification shall be the latest edition of the International Building Code (IBC), with its revisions and supplements.
- C. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.
- D. For work to be performed on-site, the requirements of this section shall apply.

**1.05 PROJECT CONDITIONS**

- A. Traffic
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.

**PART 2 PRODUCTS**

**2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. Layout Plan

1. Provide hand-marked sketch or exhibit indicating proposed location of expansion, construction, and contraction joints. All joints not marked otherwise shall be assumed as surface joints.
2. Layout plan shall be reviewed and approved by the engineer a minimum of 48 hours prior to pour. For complex pours, allow additional time for review, approval, and related revisions to pour plan and formwork. No additional time or cost shall be added to the contract for formwork revisions.

## **2.02 MATERIALS**

### **A. Subgrade**

1. Crushed Surfacing (Gravel Base): The gravel base shall meet the requirements of Section 9-03.9(3) of the Standard Specifications.

### **B. Concrete**

1. Concrete sidewalks, plazas and walkways:
  - a. Public Portland Cement
    - 1) ASTM C150; normal type II
  - b. Fine and Coarse Aggregates
    - 1) Clean, hard, durable particles of natural sand conforming to ASTM C33 for fine aggregate. Clean, uniformly hard, durable particles of gravel or crushed stone conforming to ASTM C33 for coarse aggregate.
  - c. Water
    - 1) Potable
  - d. Strength
    - 1) Class 3,000 (psi)
  - e. Slump
    - 1) 3 1/2" maximum
  - f. Fiber (where noted on the drawings)
    - 1) Product shall be Microfiber by Grace Construction Products, Fiberstrand 100 by Euclid, Fibermesh 150 by Propex or approved equal.
    - 2) Strand length shall be 3/4".
    - 3) Dose at one (1) pound per cubic yard.
2. Concrete curbs
  - a. Conform to the specifications listed in the drawings.
3. Driveways and concrete flatwork within the limits of vehicular traffic
  - a. Conform to the specifications listed in the drawings.

### **C. Formwork and Accessories**

1. Formwork
  - a. Straight forms

- 1) **Metal side forms** with base width sufficient to support finishing equipment.  
Maximum variation 1/8" in 10 feet.
- b. Curved forms
  - 1) Metal or wood.
2. Joint Filler
  - a. Width as specified herein
  - b. Products
    - 1) Asphaltic impregnated fiberboard
    - 2) Nomaflex™ semi-rigid, closed cell polypropylene pre-formed joint filler by Nomaco
    - 3) Approved equal
3. Expansion Joint Sealer
  - a. Self-leveling, Sikaflex-1c SL or approved equal.
- D. Concrete Mix
  1. Mix and proportion to produce minimum specified strength concrete at 28 days with 5 to 7 percent air entrainment, ASTM C94 and ASTM C260. Cement concrete conforming to the requirements of WSDOT Section 6-02.3(2)B for Commercial Concrete.
  2. Use set-retarding admixtures during hot weather only when acceptable to Owner.
- E. Bonding Agent
  1. Conform to WSDOT Section 9-26.1.
- F. ADA Truncated Dome
  1. Product shall be a cast-in-place product; surface applied products are not permitted.
  2. Product shall meet all state and local ADA requirements.
  3. Color shall be yellow unless noted otherwise on the Drawings.
  4. Select widths which allow for symmetrical installations, i.e. use two 2' x 3' tiles or three 2' x 2' tiles for a 6' wide ramp, not one 2' x 2' and one 4' x 2'.
  5. Unless noted on the Drawings, tiles shall not be cut without written approval of the engineer.
  6. Include maintenance and warranty requirements in project O&M manual.
  7. Product shall be Armor-Tile™ Cast In Place or approved equal.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

#### **3.02 CONSTRUCTION REQUIREMENTS**

- A. Forming
  1. Place and secure forms to correct location, dimension, and profile.
  2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

3. Place joint fillers vertical in position, in straight lines. Secure to formwork during concrete placement.
  4. Provide expansion and contraction joints in accordance with industry standards.
  5. For curved section, provide adequate staking in order to provide a smooth curve without angle points or compound curvature. Ensure that there are no angle points at the point-of-curvature/tangency with adjoining straight sections. As-constructed radius length shall not vary more than 1/2" over a 2 L.F. distance along face of curb/sidewalk.
  6. Any changes to grades or dimensions of curb or flatwork shall be approved in writing by the engineer prior to forming.
  7. Upon complete of formwork, re-tamp crushed rock surfacing inside the forms (with a hand tamp) as necessary to ensure compaction and a firm stable subgrade.
  8. Form Review
    - a. Owner/engineer shall review constructed formwork prior to pour.
    - b. Allow time for revisions to formwork based on Owner review. No additional time or cost shall be added to the contract for formwork revisions.
    - c. Concrete placed prior to form review is subject to rejection.
- B. ADA Ramps
1. Refer to Section 31 22 00 for grading requirements at ADA ramps.
- C. Placing Concrete
1. Place concrete in accordance with ACI 301.
  2. Hot Weather Placement
    - a. ACI 301
  3. Place concrete over the entire width of subgrade between forms to prevent segregation and minimize rehandling.
  4. Thoroughly vibrate along forms or sides and along expansion joints.
- D. Concrete Finishing
1. Samples
    - a. Prepare 3' x 3' samples of both "light broom finish" and "medium broom finish" for the Owner's approval.
    - b. Samples shall include an example tooled joint in addition to edge banding (if included in the project).
  2. Screed accurately to elevations and slopes shown without irregularities. Place expansion joints. Allow concrete time to bleed naturally before working. Float to compact plastic mass. Do not overwork. Provide finish in direction shown on the Drawings or as directed. Tool a pattern as shown or directed.
  3. For on-site work, provide broom finish as shown in the Contract Plans and Details. Be aware that the required finish may vary at different locations and conditions within the project.
  4. Broom finishing patters shall conform with the Drawings – do not provide or create any alternative or additional broom patterns.

5. Bleed water shall not be finished into the concrete surface.
  6. Wire brush all tooled joints and edges. Delay wire brushing until enough cure has occurred that wire brushing activity does not mark the concrete.
- E. Joints
1. General
    - a. Provide layout Drawing for review and approval as required in Part 1 Submittals.
    - b. Contraction joints maybe used in place of surface joints
  2. Expansion/Isolation Joints
    - a. At all structures, slabs, curbs, foundations, and other features.
    - b. Joint shall be 3/8-inch wide at sidewalks, ramps, curbs and sidewalks. Joint shall be 1/2-inch wide at structures (columns, light poles, manholes, catch basins, etc.) and footings.
    - c. Filled with pre-molded joint filler and sealed with joint sealant.
    - d. Finish edges with 3/8-inch radius tool.
  3. Construction/Cold Joints
    - a. At close of each day's work or when the work is stopped or interrupted for more than 30 minutes.
    - b. Shall be located at a pre-approved joint location.
    - c. Form with wood header.
    - d. Construct per the requirements for expansion/isolation joints (radius, filler and sealant).
  4. Contraction/Control Joints
    - a. Not less than 1/4-inch thick by 1/4 depth of slab.
    - b. Tool joint with 3/8-inch radius tool.
    - c. Install at maximum spacing of 15'.
  5. Surface Joints
    - a. Tool joint with 3/8-inch radius tool.
  6. Sawcut joints
    - a. Not permitted without written approval of the engineer.
  7. Tee intersections
    - a. Drill hole at all tee intersections to prevent sympathy cracks.
    - b. Hole diameter shall be joint width minus 1/16".
  8. Sealant
    - a. As specified in Part 2 of this Section. Install in all expansion/isolation joints prior to use.
- F. Curing
1. Conform with ACI 308 for water curing.

2. Immediately after finishing, as soon as marring of concrete will not occur, install white polyethylene sheeting over entire surface. Lap sheeting 18 inches, minimum. Leave sheeting in place a minimum of 7 days.

### **3.03 QUALITY ASSURANCE**

- A. The evaluation of concrete flatwork and curbing for acceptance shall occur near the end of the project after the concrete has cured and after the majority of construction activities have been completed. It shall be the contractor's responsibility to protect concrete work throughout the construction duration.

### **3.04 TOLERANCE ACCEPTANCE**

#### A. Cracks

1. Hairline cracks shall be repaired with a sand/cement slurry worked into the crack with a fine brush. Utilize fine sand with similar color properties in order to minimize the appearance of the repair.
2. Panels or small lengths of curb with multiple hairline cracks are subject to rejection at the owner's discretion. Rejected panels shall be removed and replaced at no additional cost to the owner.
3. Panels with cracks exceeding 1/32" are subject to rejection at the owner's discretion. Rejected panels shall be removed and replaced at no additional cost to the owner.

#### B. Chips or Other Damage

1. Chips or other damage to newly poured concrete flatwork and curbs shall be evaluated on a case-by-case basis. The contractor shall review the damage and propose a repair. The proposed repair shall be submitted to the engineer for review and approval prior to any work being performed. The contractor shall be aware that patches may not be acceptable in some cases, and cutting, removal, and replacement may be required at the owner's discretion, and at no additional cost to the owner.

#### C. Rejection

1. Cracked, chipped, or damaged panels are subject to potential rejection as described above.
2. Any pours which occur without the required call for formwork inspection are subject to rejection if found to be non-compliant for grade, width, jointing, exposure, or forming issues.
3. Any changes to the approved plans made without written approval of the engineer are subject to rejection, regardless of other approvals.

### **3.05 PROTECTION**

- A. Provide protection from premature drying, excessive hot or cold temperatures, and vandalism. Remove damaged or vandalized concrete from site and replace per specification at no extra cost to Owner.
- B. Protect all new concrete from spills, adjacent work (asphalt, painting, etc.), wash water, test water, and other sources of staining.
- C. No vehicles of any kind shall be permitted on the new concrete surfaces for 7 days after the pour. Beyond 7 days, access will be allowed on a case-by-case basis and will require that the surface be protected plywood (plastic or geo-fabric will not be an acceptable level of protection).
- D. Protect ADA Truncated Domes during remainder of construction with plywood or alternative.

- E. Any marks on concrete flatwork, curbs, or truncated domes that are the result of construction activities shall be removed and/or repaired so that the work is turned over to the owner in a “new” condition. This includes scrapes, gouges, tire marks, spillage, etc.

END OF SECTION



**SECTION 32 17 23  
PAVEMENT MARKINGS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to place pavement markings and appurtenant items as shown on the Drawings.

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 STANDARD SPECIFICATIONS**

- A. Standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. Reference specification shall be the latest edition of the International Building Code (IBC), with its revisions and supplements.
- C. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.
- D. For work to be performed on-site, the requirements of this section shall apply.

**1.05 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

**1.06 PROJECT CONDITIONS**

- A. Traffic
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.

**PART 2 PRODUCTS**

**2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. Submittals shall be labeled so as to identify for which product(s) the Contractor is seeking approval. **Unlabeled or unorganized submittals will be returned unreviewed.**

## **2.02 MATERIALS**

- A. Pavement Striping
  - 1. Factory mix
  - 2. Quick drying
  - 3. Non-bleeding
  - 4. Water-based or water-borne
  - 5. Low VOC
  - 6. Prohibited Materials
    - a. paint shall not contain mercury, lead, chromium, toluene, chlorinated solvents, hydrolysable chlorine derivatives, ethylene based glycol ethers and their acetates, nor any other EPA hazardous waste material over the regulatory levels per CFR 40 Part 261.24.
  - 7. Vehicle Areas
    - a. Shall comply with Federal Specification TT-P-1952E, Type III (increased durability),
    - b. Color: white, yellow, red, or blue as specified on the Contract Drawings.
    - c. White. Federal Standard 595, color number 37875.
    - d. Yellow. Federal Standard 595, color number 33538.
    - e. Red. Federal standard 595, color 31350.
    - f. Blue. Federal Standard 595, color number 35180.
- B. Pavement Markings
  - 1. Material
    - a. Directional arrows, crosswalks, stop bars, ADA markings, and other items as noted on the Contract Drawings shall be Type B – Pre-Formed Fused Thermoplastic per Section 9-34 of the WSDOT Standard Specifications. All crosswalk markings shall have enhanced skid resistance surface meeting a minimum 60 BPN.
  - 3. Color
    - a. White
      - 1) Federal Standard 595, color number 37875. Unless otherwise noted on the Contract Drawings, includes all items except for the required blue ADA background and as otherwise noted on the Drawings.
    - b. Blue
      - 1) Federal Standard 595, color number 35180. Includes required blue ADA background.

## **2.03 PRODUCT HANDLING**

- A. Use all means necessary to protect the materials of this section before, during, and after installation.
- B. Deliver all materials to the job site in their original containers with labels intact and legible, when applicable. Store in accordance with manufacturer's recommendations.

## **PART 3 EXECUTION**

**3.01 CONSTRUCTION REQUIREMENTS**

- A. Pavement marking and striping work shall be performed in accordance with Section 8-22 of the Standard Specifications.
- B. Two applications of paint shall be required to complete all pavement marking and striping work.
- C. Removal of incorrectly installed striping on asphalt pavement shall be achieved by application of black out paint. Grinding is not acceptable.

**3.02 CLEAN UP**

- A. All dirt, soil, debris, excess materials of any nature shall be removed and disposed of off-site and areas shall present a clean workmanlike appearance.
- B. Remove any overspray.

END OF SECTION

**SECTION 32 91 13  
SOIL PREPERATION**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. Project Geotechnical Report
  - 1. Geotechnical Site Investigation for Mountain View Library by Columbia West Engineering.
- D. See Section 31 25 00 for Erosion and Sedimentation Control.
- E. See Section 31 23 19 for Dewatering.
- F. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.
- G. References
  - 1. Soil classifications standards used herein for existing and imported soils include but are not limited to the following.
    - a. ASTM Soil Quality Standards.
    - b. Classification: ASTM D 2487-00.
    - c. Gradation of Soils: ASTM D 422-63 (1998).
    - d. Liquid Limit and Plasticity Index: ASTM D 4318-94(2001) e1.
    - e. Moisture-Density Relations: ASTM D 1557-00.
    - f. Permeability of Soils: ASTM D 2434-68(2000).

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services for testing, preparation, coordination, and placement of topsoil and required soil amendments with the establishment of rough grades as indicated by the Drawings and as specified.

**1.03 DEFINITIONS**

- A. Finish Grade - Elevation of finished surface of planting soil.
- B. Topsoil - Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- C. Subgrade - Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath topsoil.
- D. AHJ – Authority Having Jurisdiction

**1.04 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

**1.05 PROJECT CONDITIONS**

- A. The Contractor shall examine the entire site for conditions that will adversely affect execution, permanence and quality of work. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Prior to the work of this section all rough graded subgrade surfaces shall be free of:
  - 1. Concrete, asphalt, and other construction or demolition debris;
  - 2. Limbs, twigs, cones, seedpods and other woody material; and
  - 3. Rock, gravel or other material not suitable for plant growth.
- C. The Contractor shall prepare topsoil only when weather and soil conditions allow. Do not attempt soil preparation work when weather or soil conditions would contribute to poor or improper mixing, voids, or other adverse conditions/
- D. The Contractor shall take all precautions to prevent runoff of topsoil and fertilizers from leaving site or entering storm systems, or any waterway.

**PART 2 PRODUCTS**

**2.01 SUBMITTALS**

- A. Prior to use on site or the start of work, the Contractor shall submit the following information to the Testing Laboratory. All product samples must include sufficient volume for the Testing Laboratory to make a reasonable analysis.
  - 1. Certified Analysis
    - a. All compost mixture components required by these specifications or as required by testing laboratories to bring soil into compliance with these specifications.
    - b. All fertilizer mixes required by the specifications or as required by testing laboratories to bring soil into compliance with these specifications.
    - c. All on-site or imported topsoil required by these specifications.
  - 2. Where any tests show results failing to conform to the required standards the Contractor shall include with the testing report a recommended treatment plan to bring the material into conformance.
  - 3. Available Testing Laboratories
    - a. Soil and Plant Laboratory, Inc. – 503-557-4959.
    - b. Western Agricultural Laboratories – 503-968-9225.
  - 4. Product Samples
    - a. Topsoil Mixture.

**2.02 MATERIALS**

- A. Topsoil
  - 1. Meet the requirements of Washington State Department of Ecology BMP T5.13 “Post-Construction Soil Quality and Depth” as stated on the Drawings.

2. Acidity range (pH) of 6.0 to 8.0.
3. Organic matter content (OMC) shall be minimum 5 percent in turf areas and 10% minimum in planting areas (by volume). OMC shall be maximum of 20 percent organic material content by volume.
4. A maximum of 25 percent decaying content by volume.
5. Free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
6. Textural Class Requirements - Topsoil textural analysis shall fall within the following gradations.

<b>Textural Class</b>	<b>% of Total Weight</b>	<b>Average %</b>
Sand (0.05-2.0mm dia.)	45-75	60
Silt (0.002-0.05mm dia.)	15-35	25
Clay (less than 0.002mm dia.)	5-20	15

B. Inorganic Soil Amendments

1. Lime
  - a. ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent:
2. Class
  - a. Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing through No. 60 sieve.
  - b. Class O, with a minimum 95 percent passing through No. 8 sieve and a minimum 55 percent passing through No. 60 sieve.
3. Provide lime in form of dolomitic limestone.
4. Sulfur
  - a. Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 sieve and a maximum 10 percent passing through No. 40 sieve.
5. Iron Sulfate
  - a. Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
6. Aluminum Sulfate
  - a. Commercial grade, unadulterated.
7. Agricultural Gypsum
  - a. Finely ground, containing a minimum of 90 percent calcium sulfate.
8. Sand
  - a. Clean, washed, natural or manufactured, free of toxic materials.
9. Diatomaceous Earth
  - a. Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

10. Calcined Clay
    - a. An inorganic soil amendment formed by expanding clay at high temperatures (calcining), and used to alter soil strength by affecting its ability to retain moisture.
  11. EarthLite Filter Media
    - a. As manufactured by Sunmark Seeds; 1.888.214.7333; Contact – Robin Cook.
  12. Zeolites
    - a. Mineral clinoptilolite with at least 60 percent water absorption by weight.
- C. Compost/Mulch
1. Shall meet the definition of “Composted Materials” per WAC 173-350-220.
  2. Shall be coarse mulch (non-floating).
  3. Organic matter content shall be between 35% and 65%.
  4. Carbon to Nitrogen ration shall be below 25:1.
  5. Compost shall be well-composted, stable, and weed-free organic matter with pH range of 5.5 to 8 and 100 percent passing through 3/4-inch sieve. Compost shall not have contents exceeding 0.5 percent inert contaminants and shall be free of substances toxic to plantings.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. The Contractor shall eliminate uneven areas and low spots, remove lumber, stones, sticks, mortar, concrete, rubbish, debris, contaminated soil and any other material harmful to plant life.
- B. Rock Picking
1. The contractor shall perform hand-based rock picking activities to remove visible rocks larger than 3/4” in any dimension. Rock picking shall be performed:
    - a. Prior to placement of topsoil to remove rocks from the finished subgrade.
    - b. After placement of topsoil to remove rocks from the finished surface grade.
- C. Weeding
1. The Contractor shall verify that invasive species and weeds have been eliminated prior to the placement of topsoil.
  2. The Contractor shall apply weed killer to all stripped surfaces, RoundUp™ Weed & Grass Killer, or approved equal, prior to mass grading efforts. For where blackberry bushes and brush are cleared, RoundUp™ Wild Blackberry Plus Vine and Brush Killer, or approved equal, shall be applied.
- D. Newly Graded Subgrades
1. Loosen subgrade to a minimum depth of 4 inches.
  2. Perform rock picking, and remove sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  3. Thoroughly blend topsoil mix before spreading.
  4. Spread topsoil mix to a minimum depth of 8 inches, but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

- c. Spread planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade.
- E. Finish Grading
1. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### **3.02 CONSTRUCTION REQUIREMENTS**

- A. Rough Grading Inspection
1. Contractor shall notify Owner's Representative a minimum of 24 hours in advance for inspection of rough grades.
- B. The Contractor shall verify that rough grades of areas to be planted are set at sufficient depth to allow for placement of specified materials. If the site is not suitable for landscaping operations, the Contractor shall perform necessary corrective work.
- C. Topsoil placement or backfilling in areas to be landscaped shall not occur until the Owner's Representative has issued written approval of both the subgrade preparation and topsoil material submittal.
- D. The Contractor shall provide sample of stockpiled topsoil from project site for laboratory testing.
- E. Existing topsoil shall be amended per recommendations of the laboratory testing, or else topsoil meeting these specifications shall be imported from off-site.
- F. Planting soil shall be placed at specified grades and compacted to a minimum depth as shown on the contract Drawings.

### **3.03 QUALITY ASSURANCE**

- A. All soil preparation work shall be done under the supervision of a Contractor having experience in landscape construction. All work shall be done in accordance with proper horticultural practices.
- B. The Contractor shall store fertilizer and other required materials in a dry place and free from the intrusion of moisture.
- C. All topsoil and compost must be tested by an independent testing laboratory and certified that it is in conformance with the requirements of these specifications.
- D. Soil/Compost Testing Laboratory Qualifications
1. An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- E. Topsoil Analysis
1. Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
    - a. Topsoil Analysis Report must include analysis of suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

### **3.04 CLEAN-UP**

- A. Keep project site free from accumulation of debris, topsoil, and other material.



- B. At completion of work, completely remove debris, equipment and surplus materials.
- C. Any paved area or surfaces stained or soiled from landscaping materials shall be cleaned with a power sweeper using water under pressure. Building surfaces that have been stained or discolored by topsoil the work shall be washed with proper equipment and materials as approved by the Owner's Representative.

END OF SECTION

**SECTION 33 11 13  
WATER SYSTEM**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. See Section 31 25 00 for Erosion and Sedimentation Control.
- D. See Section 31 23 19 for Dewatering.
- E. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services for the installation of public and private water main piping and appurtenances of the types and sizes designated in accordance with the Drawings, these Specifications, and the Standard Drawings, in conformity with the lines and grades as shown on the Drawings, in general 5-feet outside of the building footprint (sitework).

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 STANDARD SPECIFICATIONS**

- A. Reference specifications shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. Reference specification shall be the latest edition of the Uniform Plumbing Code (UPC), with its revisions and supplements.
- C. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.
- D. For work to be performed on-site, the requirements of this section shall apply.

**1.05 PERMITS**

- A. Right-of-Way Permit
  - 1. A Right-of-Way/Road Cut Permit is required for work within the public right-of-way. The Contractor shall be responsible for submitting the application and obtaining the permit, including any required traffic control plans.

**1.06 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

### **1.07 PROJECT CONDITIONS**

- A. Traffic
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.
- B. Utilities Locate
  - 1. Contractor shall call for utility locator service for the project area prior to any grading, excavation or utility work.
- C. State and local code requirements shall control disposal of debris, which shall be at an approved off-site location.
- D. Existing water lines are located throughout the project site. These mains and pipes will be either protected, abandoned, removed, or re-connected as indicated on the Drawings. The existing system shown is based on record drawings and may vary in the field. Prior to performing any of the abandoning and relocation work, the Contractor shall verify the lines and inform the Engineer of any discrepancies.

## **PART 2 PRODUCTS**

### **2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. Submittals shall be labeled so as to identify for which product(s) the Contractor is seeking approval. **Unlabeled or unorganized submittals will be returned unreviewed.**
- C. Furnish reproducible "as-built" drawings.

### **2.02 MATERIALS**

- A. Public Water - Conform to the standards of the AHJ.
- B. Private Water
  - 1. Domestic Line. Unless otherwise noted on the Contract Drawings, materials for private domestic waterline and fittings downstream of meter shall meet Uniform Plumbing Code.
  - 2. Fire Service. The fire service, from the POC at the public main to the mechanical room, is subject to design by a licensed fire sprinkler contractor, and is not covered by this specification. All materials shall meet the requirements stated in the licensed fire design.
  - 3. Backflow Devices. Furnish and install Washington State Approved backflow devices.

### **2.03 PRODUCT HANDLING**

- A. Use all means necessary to protect the materials of this section before, during, and after installation.
- B. Deliver all materials to the job site in their original containers with labels intact and legible, when applicable. Store in accordance with manufacturer's recommendations.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Public Water
  - 1. Public water system installation shall be in conformance with the standards of the AHJ.
  - 2. Joint restraint shall be provided by mechanical means. Refer to Drawings for locations.

B. Private Water

1. Install private domestic water per plumbing code requirements and as indicated on the Drawings.

**3.02 ORDER OF WORK**

- A. Proposed water system and fire hydrants shall be installed, accepted, and operational prior to the start of combustible construction on the new building.

**3.03 ABANDONMENT OF EXISTING UTILITIES**

- A. Utilities to be abandoned under or within 20' of new building footprint shall be pressure grouted or removed.
- B. Utilities to be abandoned outside of (or more than 20' from) new building footprint shall be plugged and abandoned in place, or removed as necessary to allow for new construction. Plug all cut or abandoned ends of pipe.
- C. Abandonment of water lines shall be per WSDOT standards.

**3.04 CONSTRUCTION REQUIREMENTS**

- A. Grade Control - Establish and maintain required lines and elevations.
- B. Meter Boxes
1. Meter boxes shall be installed per the details on the Drawings, with the following additional requirements:
    - a. Provide 2" thickness of drain rock at the bottom of the box.
    - b. Provide risers as required to allow access and operation of the locking bypass valve.
    - c. There shall be no exposed soil within the meter box.
    - d. Adjust rim to finish grade.
    - e. Installations that do not conform to the detail are subject to rejection and re-installation at no additional cost to the owner.
- C. Tracer Wire
1. All non-metallic underground piping shall be installed with tracer wire (#14 copper).

**3.05 QUALITY ASSURANCE**

- A. Hydrostatic Pressure Test - Test water mains under hydrostatic pressure as required by the Standard Specifications.
- B. Sterilization - Water mains shall be sterilized before placing in service.
- C. All deficiencies revealed in the testing of the system as indicated above will be corrected and re-tested for approval of the systems.

**3.06 PROTECTION**

- A. All new fire hydrants shall be protected during construction. All chips, scratches, and other marks shall be repaired, including proper rust removal, priming, and application of approved coating.

**3.07 AS-BUILTS**

- A. Contractor shall be responsible for supplying reproducible water system "as-built" drawings along with record documents under the provisions of this contract.

- B. Contractor as-builts shall include changes in elevation, alignment, pipe size, material, and other pertinent information.

END OF SECTION

**SECTION 33 41 14  
STORM DRAINAGE**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The other Contract Documents complement the requirements of this section.
- B. Other sections of this Specification may relate and may impose additional work and/or additional materials upon this section. Contractor to coordinate any cross-referencing of Specification sections.
- C. See Section 31 25 00 for Erosion and Sedimentation Control.
- D. See Section 31 23 19 for Dewatering.
- E. The Contractor shall always comply with Federal, State, or local laws, ordinances, and regulations that affect the work.

**1.02 DESCRIPTION OF WORK**

- A. The scope of work under this section includes all labor, materials, equipment, transportation and services to construct manholes, grate inlets, drop inlets, catch basins, curb inlets, combination curb inlets, area drains, cleanouts, detention systems, water quality facilities, storm drainage pipe, foundation drain, and related appurtenances in reasonable close conformity with the lines and grades as shown on the drawings, in general 5-feet outside of the building footprint (sitework).

**1.03 DEFINITIONS**

- A. AHJ – Authority Having Jurisdiction

**1.04 STANDARD SPECIFICATIONS**

- A. Reference specifications shall be the latest edition of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction.
- B. Reference specification shall be the latest edition of the Uniform Plumbing Code (UPC), with its revisions and supplements.
- C. For work to be performed off-site within the public right-of-way, standard specifications referenced herein shall be the latest edition of the WSDOT Standard Specifications as prepared by the Washington State Department of Transportation as modified by the Agency Having Jurisdiction.
- D. For work to be performed on-site, the requirements of this section shall apply.

**1.05 PERMITS**

- A. Right-of-Way Permit
  - 1. A Right-of-Way/Road Cut Permit is required for work within the public right-of-way. The Contractor shall be responsible for submitting the application and obtaining the permit, including any required traffic control plans.

**1.06 WARRANTY/BONDING**

- A. Furnish labor and material warrantee or maintenance bond for all work in the public right-of-way, or easement, in accordance with requirements of the AHJ.

### **1.07 PROJECT CONDITIONS**

- A. Traffic
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities.
- B. Utilities Locate
  - 1. Contractor shall call for utility locator service for the project area prior to any grading, excavation or utility work.
- C. State and local code requirements shall control disposal of debris, which shall be at an approved off-site location.
- D. Existing storm drainage lines are located throughout the project site. These mains and pipes will be either protected, abandoned, removed, or re-connected as indicated on the Drawings. The existing system shown is based on record drawings and may vary in the field. Prior to performing any of the abandoning and relocation work, the Contractor shall verify the lines and inform the Engineer of any discrepancies.

## **PART 2 PRODUCTS**

### **2.01 SUBMITTALS**

- A. Provide materials certificates showing that products in Part 2 meet or exceed specifications.
- B. Submittals shall be labeled so as to identify for which product(s) the Contractor is seeking approval. **Unlabeled or unorganized submittals will be returned unreviewed.**
- C. Furnish reproducible "as-built" drawings.

### **2.02 MATERIALS**

- A. Storm Piping
  - 1. Acceptable pipe material shall be:
    - a. Smooth interior, high density polyethylene corrugated pipe per section 9-05.1(6) for pipe diameters less than or equal to 10" (AASHTO M252), or per section 9-05.1(7) for 12" through 36" diameter pipe (AASHTO M294). MEGA GREEN™ water-tight recycled content pipe by ADS shall also be an approved material.
    - b. ASTM D3034 PVC (SDR 35)
    - c. Approved equal.
  - 2. For tight-line pipe, all storm drainage joints shall be gasketed and water tight. Soil tight shall not be acceptable.
- B. Grates
  - 1. All grates shall be one-piece cast iron (not welded), manufactured to conform to an H-20 wheel load. Grates in pedestrian areas shall comply with Americans With Disabilities Act (ADA) requirements.
  - 2. All catch basins shall be set to final grade by use of concrete rings and adjustment collars made for that purpose.
  - 3. All catch basin grates within the project limits shall have the wording "Dump No Waste - Drains to Streams" painted on the adjacent pavement using a stencil.
- C. Bedding and Backfill

1. Storm Piping
  - a. Refer to Contract Drawings for bedding and backfill material requirements.
2. Drain Rock
  - a. Provide crushed rock meeting WSDOT 9-03.12(5) Gravel Backfill for Drywells
- D. Plaza Drain
  1. Meet the model number and requirements stated in the detail on the Contract Drawings, including seepage pan and sediment bucket. Provide polished bronze heel-proof grate.
- E. Water Quality Treatment Soil
  1. Meet the requirements stated in the detail on the Contract Drawings.
- F. Other
  1. Other materials shall meet the requirements stated on the Drawings.

### **2.03 PRODUCT HANDLING**

- A. Use all means necessary to protect the materials of this section before, during, and after installation.
- B. Deliver all materials to the job site in their original containers with labels intact and legible, when applicable. Store in accordance with manufacturer's recommendations.

### **PART 3 EXECUTION**

#### **3.01 ABANDONMENT OF EXISTING UTILITIES**

- A. Utilities to be abandoned under or within 20' of new building footprint shall be pressure grouted or removed.
- B. Utilities to be abandoned outside of (or more than 20' from) new building footprint shall be plugged and abandoned in place or removed as necessary to allow for new construction. Plug all cut or abandoned ends of pipe.
- C. Abandonment of storm drainage lines shall be per WSDOT standards.

#### **3.02 CONSTRUCTION REQUIREMENTS**

- A. The Contractor shall perform all work in accordance with the Drawings, details, specifications, and best industry practices.
- B. Storm drainage pipe shall be constructed per the requirements of Section 7 of the Standard Specifications. Catch basins, manholes, and other storm structures shall be constructed per the requirements of Section 7 of the Standard Specifications.
- C. All trench backfill shall be compacted, including infiltration trenches.
- D. All work shall be performed so as to eliminate sediments from being transported into the drainage system during the construction phase. Provide all necessary temporary filtration devices and drain inlet protection to capture runoff sediment.
  1. Best Management Practices (BMP's) shall be used to protect drainage system and catch basins from soil erosions and other pollutants.
- E. The contractor shall leave the pipe joints uncovered until visual observation by the owner's representative is completed.
- F. Tracer wire shall be installed with all non-metal pipe. Tracer wire shall be #14 copper wire.



1. Tracer wire not required for underdrainage systems.
- G. Foundation drains shall be installed at the building footings. Foundation drains shall be connected to site storm mains at one or more locations to be determined in the field by the contractor. Install backwater valve at all points-of-connection to the site storm main per the detail on the Contract Drawings.
  1. Erosion and Pollution Control
    - a. Stormwater runoff that is sent to sacrificial infiltration systems shall not contain sediment or pollutants. Route construction runoff through bladder bags, sediment ponds, or other approved BMP as needed to remove sediment and pollutants.
  2. Abandon
    - a. Upon completion of construction, sacrificial infiltration systems shall be properly abandoned. Remove surface structures, fill voids with clean sand and plug all pipe ends.

### **3.03 QUALITY ASSURANCE**

- A. Inspection
  1. Inspect interior of piping to determine whether line displacement or other damage has occurred.
    - a. Make inspections after pipe between manholes and manhole locations have been installed and approximately 2 feet of backfill is in place, and again at completion of project.
    - b. Inspection of pipes is required from manhole to manhole using natural or artificial light.
    - c. If inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects, the Contractor shall correct such defects and notify Owner for re-inspection.
- B. Testing
  1. Testing of private storm lines shall be per the Uniform Plumbing Code.
  2. Additional testing as identified on the Contract Drawings.

### **3.04 TOLERANCE ACCEPTANCE**

- A. Tolerances for storm drainage shall be as indicated in the WSDOT Standard Specifications.

### **3.05 AS-BUILTS**

- A. Contractor shall be responsible for supplying reproducible storm drainage “as-built” drawings along with record documents under provisions of the Contract.
- B. As-builts shall be based on post-construction topographic survey shots of rim, invert and riser elevations of all storm structures (catch basins, manholes, outfalls, control structures, etc.). Elements that are found to be in non-conformance with the approved Drawings are subject to rejection and repair/replacement as determined by the Engineer and at the Contractor’s expense.
- C. Contractor’s as-builts shall include changes in elevation, alignment, pipe size, material, and other pertinent information.

END OF SECTION

