

**PORT OF TACOMA
TACOMA, WASHINGTON
EBC SILVERBACK TEMPORARY RELOCATION**

PROCUREMENT NO. 122025-1006

PROJECT NO. 101686.01

CONTRACT NO. POT-PA-0000000292

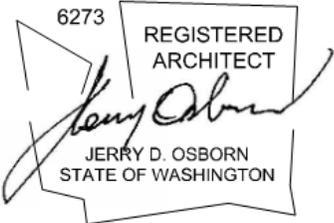
**Thais Howard, PE
Director, Engineering**

**Elly Bulega, PE
Project Manager**

END OF SECTION

The undersigned Engineer of Record hereby certifies that the Technical Specifications for the following portions of this project were written by me, or under my direct supervision, and that I am duly registered under the laws of the State of Washington, and hereby affix my Professional Seal and signature.

Those Sections prepared under my direct supervision and being certified by my seal and signature below are as follows:

<u>SEAL & SIGNATURE</u>	<u>SECTION(S)</u>
	05 50 00 – Metal Fabrications 07 92 00 – Joint Sealants 08 10 00 – Steel Doors and Frames 08 36 00 – Overhead Sectional Doors 08 71 00 – Door Hardware 09 91 00 – Painting 10 52 00 – Specialties 13 34 19 – Metal Building Systems 32 31 13 – Chain Link Fencing and Gates
	23 00 00 – General Mechanical Requirements 23 05 29 – Hangers and Supports 23 05 53 – Identification for Piping and Equipment 23 05 93 – Testing, Adjusting, and Balancing for HVAC 23 09 00 – Instrumentation and Controls 23 09 93 – Sequence of Operation 23 31 00 – Ducts and Casings 23 33 00 – Air Duct Accessories 23 34 00 – HVAC Fans 23 37 00 – Air Outlets and Inlets 23 54 00 – Heaters
	26 00 00 – Electrical Work General 26 01 00 – Operation and Maintenance Manuals 26 05 00 – Common Work Results for Electrical 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 33 – Raceway and Boxes for Electrical Systems 26 05 43 – Underground Ducts and Raceways for Electrical Systems 26 05 48 – Vibration and Seismic Controls 26 05 53 – Electrical Identification 26 08 00 – Commissioning of Electrical Systems 26 08 01 – Electrical Testing 26 22 00 – Dry-Type Transformers 26 24 16 – Panelboards 26 27 16 – Cabinets and Enclosures 26 28 13 – Fuses 26 28 16 – Enclosed Switches and Circuit Breakers 26 43 13 – Transient Voltage Surge Suppression (TVSS)

END OF SECTION

PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

- 00 01 01 - Project Title Page
- 00 01 07 - Seals Page
- 00 01 10 - Table of Contents
- 00 01 15 - List of Drawing Sheets
- 00 11 13 - Advertisement for Bids
- 00 21 00 - Instructions to Bidders
- 00 26 00 - Substitution Procedures
- 00 31 00 - Available Project Information
- 00 31 26 - Existing Hazardous Material Information
- 00 41 00 - Bid Form
- 00 43 13 - Bid Security Form
- 00 45 13 - Responsibility Detail Form
- 00 52 00 - Agreement Form
- 00 61 13.13 - Performance Bond
- 00 61 13.16 - Payment Bond
- 00 61 23 - Retainage Bond
- 00 72 00 - General Conditions
- 00 73 16 - Insurance Requirements
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- 00 73 63 - Security Requirements

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- 01 10 00 - Summary
- 01 14 00 - Work Restrictions
- 01 20 00 - Price and Payment Procedures
- 01 26 00 - Change Management Procedures
- 01 29 73 - Schedule of Values
- 01 30 00 - Administrative Requirements
- 01 31 23 - Web-based Construction Management
- 01 32 16 - Construction Progress Schedule
- 01 33 00 - Submittal Procedures

- 01 35 29 - Health, Safety, and Emergency Response Procedures
- 01 35 43.13 - Hazardous Materials Handling Procedure
- 01 35 43.19 - Export Soil Management
- 01 35 47 - Air and Noise Control Procedures
- 01 41 00 - Regulatory Requirements
- 01 42 19 - Reference Standards
- 01 45 00 - Quality Control
- 01 50 00 - Temporary Facilities and Controls
- 01 55 00 - Vehicular Access and Parking
- 01 57 13 - TESC and Project SWPPP
- 01 60 00 - Product Requirements
- 01 70 00 - Execution and Closeout Requirements
- 01 71 00 - Examination and Preparation
- 01 74 13 - Construction Cleaning
- DIVISION 02 -- EXISTING CONDITIONS
- DIVISION 03 -- CONCRETE
- DIVISION 05 -- METALS
 - 05 50 00 - Metal Fabrications
- DIVISION 07 -- THERMAL AND MOISTURE PROTECTION
 - 07 92 00 - Joint Sealants
- DIVISION 08 -- OPENINGS
 - 08 10 00 - Steel Doors and Frames
 - 08 36 00 - Overhead Sectional Doors
 - 08 71 00 - Door Hardware
- DIVISION 09 -- FINISHES
 - 09 91 00 - Painting
- DIVISION 10 -- SPECIALTIES
 - 10 52 00 - Specialties
- DIVISION 13 -- SPECIAL CONSTRUCTION
 - 13 34 19 - Metal Building Systems
- DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)
 - 23 00 00 - General Mech Requirements
 - 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
 - 23 05 53 - Identification for HVAC Piping and Equipment

- 23 05 93 - Testing, Adjusting, and Balancing for HVAC
- 23 09 00 - Instrumentation and Control Devices for HVAC
- 23 09 93 - Sequence of Operations for HVAC Controls
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DIVISION 26 -- ELECTRICAL

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- 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
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- 26 05 53 - Electrical Identification
- 26 08 00 - Commissioning of Electrical Systems
- 26 08 01 - Electrical Testing
- 26 22 00 - Dry -Type Transformers
- 26 24 16 - Panelboards
- 26 27 16 - Cabinets and Enclosures
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- 26 28 16 - Enclosed Switches and Circuit Breakers
- 26 43 13 - Transient Voltage Surge Suppression

DIVISION 32 -- EXTERIOR IMPROVEMENTS

- 32 31 13 - Chain Link Fences and Gates

APPENDICES

- Appendix A - Prefabricated Metal Building Permit No. BLDCN25-0026
- Appendix B - Silverback Modular Building Permit No. *To be Applied for with Contractor*
- Appendix C - Motive Modular Building Permit No. *To be Applied for with Contractor*
- Appendix D - Restroom Modular Building Permit No. *To be Applied for with Contractor*

Appendix E - Site Development Permit No. SDEV25-0024, FRC25-0251

Appendix F - Fence Building Permit No. BLDC25-0368

Appendix G - SWPPP Short Form

Appendix H - Existing Site Condition photos

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Contract Drawings: The following drawings are a part of the Contract Documents:

Sheet Designation	Sheet No.	Drawing Title
1	G1.0	COVER SHEET
2	G1.1	GENERAL NOTES AND ABBREVIATIONS
3	G1.2	CODE ANALYSIS
4	G1.3	SITE PLAN
5	A1.0	ARCHITECTURAL SITE PLAN
6	A1.1	METAL BUILDING FLOOR PLAN
7	A1.2	METAL BUILDING ROOF PLAN
8	A1.3	MODULAR OFFICE #1 - BASIS OF DESIGN
9	A1.4	MODULAR OFFICE #2 - BASIS OF DESIGN
10	A1.5	RESTROOM TRAILER - BASIS OF DESIGN
11	A1.6	MODULAR BUILDING SCOPE MATRIX
12	A2.1	METAL BUILDING EXTERIOR ELEVATIONS
13	A2.2	METAL BUILDING SECTIONS
14	A5.1	DETAILS
15	A6.1	SCHEDULES AND DETAILS
16	S1.0	GENERAL NOTES AND SPECIAL INSPECTIONS
17	S1.1	LOADING DIAGRAMS AND DETAILS
18	S1.2	REFERENCE RECORD DRAWING
19	M0.1	MECHANICAL LEGEND AND NOTES
20	M0.2	MECHANICAL SCHEDULES
21	M1.1	MECHANICAL FLOOR PLAN
22	E0.0	ELECTRICAL SYMBOLS
23	E0.1	ELECTRICAL ABBREVIATIONS
24	E1.0	SITE PLAN - POWER
25	E2.0	FIRST FLOOR PLAN - POWER
26	E3.0	FIRST FLOOR PLAN - LIGHTING
27	E3.1	LIGHTING DETAILS
28	E3.2	SILVERBACK BUILDING INTERIOR PHOTOMETRIC STUDY
29	E3.3	SILVERBACK BUILDING EXTERIOR PHOTOMETRIC STUDY
30	E5.0	FIRST FLOOR PLAN - FIRE ALARM
32	E6.0	DETAILS
32	E6.1	GROUNDING DETAILS
33	E10.0	ONE-LINE DIAGRAM
34	E10.1	PANEL SCHEDULES
35	E10.2	PANEL SCHEDULES
36	E10.3	PANEL SCHEDULES

37	E10.4	TEMPORARY SERVICE MOUNTING DETAIL
38	E10.5	WEATHERHEAD MAST AND MOUNTING DETAIL

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

EBC SILVERBACK TEMPORARY RELOCATION

PROJECT NO. 101686.01 | CONTRACT NO. POT-PA-0000000292

- Scope of Work:** The Work required for this Project includes:
Design, procurement and installation of a new prefabricated metal building on an existing slab, procurement and installation of modular buildings, connecting modular buildings to utilities, and all other miscellaneous work as described in the project documents.
- Bid Estimate:** Estimated cost range is \$3,900,000 to \$4,300,000, plus Washington State Sales Tax (WSST).
- In accordance with RCW 39.04.320, fifteen (15) percent apprenticeship participation is required for certain projects estimated to cost one million (\$1,000,000) dollars or more. Bidders may contact the Department of Labor and Industries, Specialty Compliance Services Division, Apprenticeship Section, P.O. Box 44530, Olympia, WA 98504-4530, by phone (360) 902-5320, or e-mail at Apprentice@lni.wa.gov, to obtain information on available apprenticeship programs.
- Sealed Bid Date/ Time/Location:** Bids will be received at the Front Reception Desk, Port Administration Office, One Sitcum Plaza, Tacoma, Washington 98421 until **2:00 P.M. on January 28th, 2026**, at which time they will be publicly opened and read aloud and the apparent low bid will be determined.
- Pre-Bid Conference and Site Tour:** A pre-bid conference and site visit have been set for January 7, 2026 at 11:00 AM. The site visit will convene at the project site. The following Personal Protective Equipment is required for the site visit: sturdy shoes, reflective vest, gloves, safety glasses, hearing protection, and hardhat.
- Attendees will be required to sign a Release and Acceptance of Responsibility and Acknowledgement of Risks Form prior to entering the site and shall provide their own Personal Protection Equipment (PPE) as required above.
- Bid Security:** Each Bid must be accompanied by a Bid security in an amount equal to five (5) percent of the Base Bid in a form allowed by the Instructions to Bidders.

Contact Information: Any questions to the Port may be submitted to the Procurement Department through the Procurement and Question Submission Portal (Portal link is accessible via this specific procurements website. See left side of page.). A direct link is also available here: [Procurement and Question Portal Link](#). No oral responses will be binding by the Port.

Instructions for utilizing the portal can be found here: [Procurement and Question Submission Portal Instructions](#).

Questions will not be accepted after seven (7) days prior to the Bid Date.

Bidding Documents: Plans, Specifications, Addenda, and Plan Holders List for this Project are available on-line through The Port of Tacoma's Website portoftacoma.com. Click on "Contracts," "Procurement," and then the Procurement Number POT-PA-0000000292. Bidders must subscribe to the Holder's List on the right hand side of the screen in order to receive automatic email notification of future addenda and to be placed on the Holder's List.

Holder's Lists will be updated regularly and posted to the specific procurements page. Additional Instructions available in Section 00 21 00 - Instructions to Bidders.

Public Works Training Requirements: Effective July 1, 2019, all businesses are required to have training before bidding on public works projects and prevailing wage under RCW 39.04.359 and RCW 39.12, or is on the list of exempt businesses maintained by the Department of Labor and Industries. The bidder must designate a person or persons to be trained on these requirements. The training will be provided by the Department of Labor and Industries or by a training provider whose curriculum is approved by the Department of Labor and Industries.

Please refer to Labor and Industries' web site (https://www.lni.wa.gov/TradesLicensing/PrevWage/Contractors/Training.asp?utm_medium=email&utm_source=govdelivery) for more information and training dates, requirements, and exemptions. Failure to attend this training could result in a determination of "not responsible" and the bidder not being awarded a public works contract.

Additional Information: In accordance with new legislation HB 1050 all port districts are required to add the requirement that apprentices must perform 15% or more of the total labor hours in public works contracts estimated at \$1 million or more. If the 15% apprenticeship labor hours is met the contractor will receive an incentive fee of \$1,000. If less than 15% apprenticeship labor hours is used a \$500 decrease in the total amount of the contract will be taken for not meeting the required apprenticeship labor hours. L&I will monitor apprenticeship labor hours

END OF SECTION

PART 1 - SUMMARY

1.01 DEFINITIONS

All definitions set forth in the Agreement, the General Conditions of the Contract for Construction, and in other Contract Documents are applicable to the Bidding Documents.

- A. "Addenda" are written or graphic instruments issued prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications, or corrections. The contents of an Addendum are issued in no particular order and therefore should be carefully and completely reviewed.
- B. An "Apprentice" is a worker for whom an apprenticeship agreement has been registered and approved by the Washington State Apprenticeship and Training Council (RCW 49.04 and WAC 296-05).
- C. "Award" means the formal decision by the Port of Tacoma ("Port") notifying a Responsible Bidder with the lowest responsive Bid of the Port's acceptance of their Bid and intent to enter into a Contract with the Bidder.
- D. The "Award Requirements" include the statutory requirements as a condition precedent to Award.
- E. The "Base Bid" is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.
- F. A "Bid" is a complete and properly signed proposal to do the Work, submitted in accordance with the Bidding Documents, for the sums therein stipulated and supported by any data called for by the Bidding Documents.
- G. The "Bid Date" is the day and hour specified in the Bidding Documents, as may be changed through an Addendum, by which Bidders are required to submit Bids to the Port.
- H. The "Bid Form" is the form(s) included with the Bidding Documents, with Specification Section 00 41 00, through which a Bidder submits a Bid.
- I. A "Bidder" is a person or entity who submits a Bid.
- J. The "Bidding Documents" include the Advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form, any other sample bidding and contract forms, including those provided by reference, the Bid security, and the proposed Contract Documents, including any Addenda issued prior to the Bid Date.
- K. The "Contract Documents" proposed for the Work consist of the Agreement, the General Conditions of the Contract (as well as any Supplemental, Special, or other conditions included in the Project Manual), the Drawings, the Specifications, and all Addenda issued prior to, and all modifications issued after, execution of the Contract.
- L. The "Schedule of Unit Prices" is a separate schedule on the Bid Form for Unit Pricing as an all-inclusive price per unit of measurement for materials, equipment, or services as described in the Bidding Documents or in the proposed Contract Documents for the optional use of the Port. Quantities are not predictions of amounts anticipated. The Port may, but is not obligated to, accept a Schedule of Unit Price if it accepts the Base Bid. The Schedule of Unit Prices are not factored into the evaluation of determining the low bid amount and are not included as part of the bid award amount.

- M. A "Sub-Bidder" is a person or entity of any tier who submits a bid or proposal to or through the Bidder for materials, equipment or labor for a portion of the Work.

1.02 BIDDER'S REPRESENTATIONS

By making its Bid, each Bidder represents that:

- A. BIDDING DOCUMENTS. The Bidder has read and understands the Bidding Documents, and its Bid is made in accordance with them.
- B. PRE-BID MEETING. The Bidder has attended pre-Bid meeting(s) required by the Bidding Documents. Attendance at a mandatory meeting or training session means that, in the sole opinion of the Port, a Project representative of a Bidder has attended all or substantially all of such meeting or session.
- C. BASIS. Its Bid is based upon the materials, systems, services, and equipment required by the Bidding Documents, and is made without exception.
- D. EXAMINATION. The Bidder has carefully examined and understands the Bidding Documents, the Contract Documents including, but not limited to, any liquidated damages, insurance provisions, and the Project site, including any existing buildings, it has familiarized itself with the local conditions under which the Work is to be performed, has correlated its observations with the requirements of the proposed Contract Documents, and it has satisfied itself as to the nature, location, character, quality, and quantity of the Work, the labor, materials, equipment, goods, supplies, work, services, and other items to be furnished, and all other requirements of the Contract Documents. The Bidder has also satisfied itself as to the conditions and other matters that may be encountered at the Project site or that may 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; climatic conditions and seasons; physical conditions at the Project site and the surrounding locality; topography and ground surface conditions; and 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.
- E. PROJECT MANUAL. The Bidder has checked its copies of the Project Manual (if any) with the table of contents bound therein to ensure the Project Manual is complete.
- F. SEPARATE WORK. The Bidder has examined and coordinated all Drawings, Contract Documents, and Specifications with any other contracts to be awarded separately from, but in connection with, the Work being Bid upon, so that the Bidder is fully informed as to conditions affecting the Work under the Contract being Bid upon.
- G. LICENSE REQUIREMENTS. The Bidders and Sub-Bidders are registered and hold all licenses required by the laws of Washington, including a certificate of registration in compliance with RCW 18.27, for the performance of the Work specified in the Contract Documents.
- H. CERTIFICATION. The Bidder verifies under penalty of perjury that the Bidder has not have 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 to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, or 49.52 RCW within the three (3) year period immediately preceding the Bid Date.

- I. NO EXCEPTIONS. Bids must be based upon the materials, systems, and equipment described and required by the Bidding Documents, without exception.

1.03 BIDDING DOCUMENTS

A. COPIES

1. Bidders may obtain complete sets of the Bidding Documents from The Port of Tacoma's Website www.portoftacoma.com. Click on "Contracts" then "Procurement."
2. Complete Sets. Bidders shall use complete sets of Bidding Documents in preparing Bids and are solely responsible for obtaining updated information. The Port does not assume any responsibility for errors or misinterpretations resulting from the use of incomplete and/or superseded sets of Bidding Documents.
3. Conditions. The Port makes copies of the Bidding Documents available only for the purpose of obtaining Bids on the Work and does not confer a license or grant permission for any other use.
4. Legible Documents. To the extent any Drawings, Specifications, or other Bidding Documents are not legible, it is the Bidder's responsibility to obtain legible documents.

B. INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

1. Format. The Contract Documents are 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.
2. Duty to Notify. Bidders shall promptly notify the Port in writing of any ambiguity, inconsistency, or error that they may discover upon examination of the Bidding Documents or of the site and local conditions.
3. Products and Installation. All Bidders shall thoroughly familiarize themselves with specified products and installation procedures and submit to the Port any objections (in writing) no later than seven (7) days prior to the Bid Date. The submittal of the Bid constitutes acceptance of products and procedures specified as sufficient, adequate, and satisfactory for completion of the Contract.
4. Written Request. Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Procurement Department through the Procurement and Question Submission Portal at least seven (7) days prior to the Bid Date (Portal link is accessible via this specific procurements website. See left side of page.). A direct link is also available here: [Procurement and Question Portal Link](#). No oral responses will be binding by the Port.

Instructions for utilizing the portal can be found here: [Procurement and Question Submission Portal Instructions](#).

5. Request to Modify Responsibility Criteria. No later than seven (7) days prior to the Bid Date, a potential Bidder may request in writing that the Port modify the Responsibility Criteria. The Port 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 Port will issue an Addendum identifying the new Criteria.

6. Addenda. The Bidder shall not rely on oral information provided at any pre-Bid meetings or during site visits. Verbal statements made by representatives of the Port are for informational purposes only. Any interpretation, correction, or change of the Bidding Documents will be made solely by written Addendum. Interpretations, corrections, or changes of the Bidding Documents made in any manner other than by written Addendum, including but not limited to, oral statements will not be binding, and Bidders shall not rely upon such statements, interpretations, corrections, or changes. The Port is not responsible for explanations or interpretations of the Bidding Documents other than in a written Addendum.
7. Site Visits. Any site visits are provided as a courtesy to potential Bidders to assist them in becoming familiar with the Project site conditions. However, only the Bidding Documents, including any issued Addenda, may be relied upon by Bidders.
8. Singular References. Reference in the singular to an article, device, or piece of equipment shall include as many of such articles, devices, or pieces as are indicated in the Contract Documents or as are required to complete the installation.
9. Utilities and Runs. The Bidder should assume that the exact locations of any underground or hidden utilities, underground fuel tanks, and plumbing and electrical runs may be somewhat different from any location indicated in the surveys or Contract Documents.

C. SUBSTITUTIONS

1. For substitutions during bidding, refer to Section 00 26 00 – Substitution Procedures.

D. ADDENDA

1. Distribution. All Addenda will be written and will be made available on the Port's website or any other source specified by the Port for the Project.
2. Copies. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
3. Verification and Acknowledgment of Receipt. Prior to submitting a Bid, each Bidder shall ascertain that it has received all Addenda issued. Each Bidder shall acknowledge its receipt and consideration of all Addenda in its Bid.

1.04 BIDDING PROCEDURE

A. FORM AND STYLE OF BIDS

1. Form. Bids (including required attachments) shall be submitted on forms identical to the Bid Form included with the Bidding Documents. No oral, email, or telephonic responses or modifications will be considered.
2. Entries on the Bid Form. All blanks on the Bid Form shall be filled in by typewriter, printer, or manually in ink.
3. Figures. All sums shall be expressed in figures, not words. Portions of the Bid Form may require the addition or multiplication of component bids to a total or the identification of component amounts within a total. In case of discrepancy between unit prices listed and their sum(s), the unit prices listed shall govern (rather than the sum).
4. Initial Changes. Any interlineation, alteration, or erasure shall be initialed by an authorized representative of the Bidder.

5. Bid Breakdown. The Bid Form may contain, for the Port's accounting purposes only, a breakdown of some or all of the components included in the Base Bid.
 - a. For lump-sum Bids, the total Contract Sum shall be submitted.
 - b. For unit-price Bids, a price shall be submitted for each item of the Work, an extension thereof, and, if requested, the total Contract Sum.
6. Schedule of Unit Prices. All Unit Prices under this schedule shall be bid. The Port reserves the right, but is not obligated, to reject any Bid on which all requested Schedule of Unit Prices are not Bid.
7. No Conditions. The Bidder shall make no conditions or stipulations on the Bid Form, nor qualify its Bid in any manner.
8. Identity of Bidder. The Bidder shall include in the specified location on the Bid Form, the legal name of the Bidder and, if requested, a description of the Bidder as a sole proprietor, a partnership, a joint venture, a corporation, or another described form of legal entity. The Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. The Port verifies signature authority on the Labor and Industries website <https://fortress.wa.gov/lni/bbip/Search.aspx> under the contractor registration business owner information. If the business owner information is not current, the Bidder shall show proof of authority to sign at the request of the Port. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder
9. Bid Amounts Do Not Include Sales Tax. The Work to be performed constitutes a "retail sale" as this term is defined in RCW 82.04.050. Thus, the Base Bid amount shall include in the sum stated all taxes imposed by law, EXCEPT WASHINGTON STATE AND LOCAL SALES TAX due on the Base Bid. The engaged Contractor will pay retail sales tax on all consumables used during the performance of the Work and on all items that are not incorporated into the final Work; this tax shall be included in the Base Bid price and in any other prices set forth on the Bid Form. The Port will pay state and local retail sales tax due on each progress payment and final payment to the engaged Contractor for transmittal by the Contractor to the Washington State Department of Revenue or to the applicable local government.

B. POTENTIAL LISTING OF SUB-BIDDERS (SUBCONTRACTORS)

1. Procedure. On projects equal to or greater than \$1,000,000, the Bid Form includes a requirement that certain Sub-Bidders be listed, in which case the Bidder must complete the required list. In these circumstances, and regardless of the anticipated cost of the Project, the Bidder must name the Sub-Bidder or Sub-Bidders with whom the Bidder, if awarded the Contract, will subcontract directly (i.e., not lower-tier Sub-Bidders) for performance of the Work of:
 - a. HVAC (heating, ventilation, and air conditioning) Work;
 - b. Plumbing Work as described in RCW 18.106;
 - c. Electrical Work as described in RCW 19.28; and
 - d. Any other categories of Work listed on the Sub-Bidder listing form and/or Bid Form.
2. Self-Performance. If the Bidder intends to self-perform any of these categories of Work, it must name itself for each such category of Work.

3. Multiple Entries. The Bidder shall not list more than one (1) entity for a particular category of Work identified, unless a Sub-Bidder will vary based on an Alternate Bid, in which case the Bidder shall identify the Sub-Bidder to be used for the Alternate and the affected portion of the Work.
4. Failure to Submit. In accordance with RCW 39.30.060, failure of a Bidder to submit, as part of the Bid, the names of such proposed HVAC, plumbing, and electrical Sub-Bidders, or to name itself to perform such Work, or the naming of two (2) or more Sub-Bidders to perform the same Work, shall render the Bidder's Bid non-responsive and; therefore, void.
5. Requirement to Subcontract. The Bidder, if Awarded the Contract, will subcontract with the listed Sub-Bidders 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 Sub-Bidder in furtherance of bid shopping or bid peddling.
6. Sub-Bidder Qualification. Listed Sub-Bidders may be required to provide evidence of their qualifications, including a statement of experience and references, prior to Award, or at any time during the Contract Time. Such information shall be provided within twenty-four (24) hours of request. This evidence shall demonstrate that the Sub-Bidder meets or exceeds all requirements for experience, qualifications, manufacturer's certifications, or any other requirements specified in any of the technical sections of the Contract Documents for which the Sub-Bidder proposes to perform Work.
7. Replacement. If a listed Sub-Bidder fails to provide adequate evidence of qualifications, is unable to comply with any bonding requirements of the Bidding Documents or with other requirements of the Contract or Bidding Documents, is not properly licensed, or fails to meet the Responsibility Criteria of the Bidding Documents, the Port may require the Bidder to replace the Sub-Bidder with another subcontractor reasonably acceptable to the Port at no change in the Contract Sum or Contract Time.
8. Sub-Bidder Standards. Sub-Bidders shall meet contractual and technical qualification standards, and provide specialized certification, licensing, and/or payment and performance bonding, if required.
9. MWBE, Veteran-owned, and small business participation encouraged. The Port's policy is to encourage the Contractor to solicit and document participation, and to provide and promote the maximum lawful, practicable opportunity for increased participation, by MWBE firms certified by the Office of Minority and Women's Business Enterprises (OMWBE), Veteran-owned businesses (defined in RCW 43.60.010, and Small, Mini and Micro business enterprises (defined in RCW 39.26.010).

C. BID SECURITY

1. Purpose and Procedure. Each Bid shall be accompanied by Bid security payable to the Port in the form required by the Bidding Documents and equal to five (5) percent of the Base Bid only (i.e., not including any Alternates or Unit Prices). The Bid security constitutes a pledge by the Bidder to the Port that the Bidder will enter into the Contract with the Port in the form provided, in a timely manner, and on the terms stated in its Bid, and will furnish in a timely manner, the payment and performance bonds, certificates of insurance, and all other documents required in the Contract Documents. Should the Bidder fail or refuse to enter into the Contract or fail to furnish such documents, the amount of the Bid security shall be forfeited to the Port as liquidated damages, not as a penalty. By submitting a Bid, each Bidder represents and agrees that the Bid security, if forfeited, is a reasonable prediction on the Bid Date of future damages to the Port. Failure of the Bidder to provide Bid Security as required shall render the bid non-responsive.
2. Form. The Bid security shall be in the form of a certified or bank cashier's check payable to the Port or a Bid bond executed by a bonding company reasonably acceptable to the Port, licensed in the State of Washington, registered with the Washington State Insurance Commissioner, possess an A.M. Best rating of "A-," Fiscal Size Category (FSC) six (6) or better, and be authorized by the U.S. Department of the Treasury. The Bid security shall be signed by the person or persons legally authorized to bind the Bidder. Bid bonds shall be submitted using the form included with the Bidding Documents.
3. Retaining Bid Security. The Port will have the right to retain the Bid security of Bidders to whom an Award is being considered until the earliest of either: (a) mutual execution of the Contract, and the Port's receipt of payment and performance bonds, (b) the specified time has elapsed so that Bids may be withdrawn, or (c) when all Bids have been rejected.
4. Return of Bid Security. Within sixty (60) days after the Bid Date, the Port will release or return Bid securities to Bidders whose Bids are not to be further considered in awarding the Contract. Bid securities of the three apparent low Bidders will be held until the Contract has been finally executed, after which all un-forfeited Bid securities will be returned. Bid security may be returned in the form provided or by separate payment.

D. SUBMISSION OF BIDS

1. Procedure. The Bid, the Bid security, and other documents required to be submitted with the Bid, shall be enclosed in a sealed envelope identified with the Project name and number and the Bidder's name and address. 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 mailing envelope.
 - a. If a Bid is mailed, it shall be addressed to the Port of Tacoma, Contracts Department, 1 Sitcum Plaza, Tacoma, WA 98421.
 - b. If a Bid is delivered, it shall be delivered to the Front Reception Desk, Port of Tacoma, 1 Sitcum Plaza, Tacoma, WA 98421.
 - c. The time stamp clock at the Front Reception Desk at 1 Sitcum Plaza is the Port's official clock.
2. Deposit. Bids shall be deposited at the designated location prior to the Bid Date indicated in the Advertisement or Invitation to Bid, or any extension thereof made by Addendum. Bids received after the Bid Date and time specified shall be returned without consideration at the discretion of the Port, or rejected at the time of receipt.

3. Delivery. The Bidder assumes full responsibility for timely delivery at the location designated for receipt of Bids.
4. Form. Oral, facsimile, telephonic, electronic, or email Bids are invalid and will not be considered.

E. MODIFICATION OR WITHDRAWAL OF BID

1. After the Bid Date. A Bid may not be modified, withdrawn, or canceled by the Bidder during a ninety (90) day period following the Bid Date, and each Bidder so agrees by virtue of submitting its Bid.
2. Before the Bid Date. Prior to the Bid Date, any Bid submitted may be modified or withdrawn only by notice to the party receiving Bids at the place designated for receipt of Bids. The notice shall be in writing, with the signature of the Bidder, and shall be worded so as not to reveal the amount of the original Bid. Email notice will not be accepted. It shall be the Bidder's sole responsibility to verify that the notice has been received by the Port in time to be withdrawn before the Bid opening.
3. Resubmittal. Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids, provided that they are then fully in conformance with these Instructions to Bidders.
4. Bid Security with Resubmission. Bid security shall be in an amount sufficient for the Bid as modified or resubmitted.

F. COMMUNICATIONS

Communications from a Bidder related to these Instructions to Bidders must be in writing to the Procurement Department through the Procurement and Question Submission Portal (Portal link is accessible via this specific procurements website. See left side of page.) A direct link is also available here: [Procurement and Question Portal Link](#). Communications, including but not limited to, notices and requests by Sub-Bidders shall be made through the Bidder and not directly by a Sub-Bidder to the Port. No oral responses will be binding by the Port.

Instructions for utilizing the portal can be found here: [Procurement and Question Submission Portal Instructions](#).

1.05 CONSIDERATION OF BIDS

- A. OPENING OF BIDS. Unless stated otherwise in the Advertisement or Invitation to Bid or an Addendum, the properly identified Bids received on time will be opened publicly and will be read aloud. An abstract of the Base Bids and any Alternate Bids will promptly (and generally within twenty-four (24) hours) be made available to Bidders and other interested parties.
- B. REJECTION OF BIDS. The Port 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 the required Bid security, or to reject a Bid which is in any way incomplete or irregular.
- C. BIDDING MISTAKES. The Port will not be obligated to consider notice of claimed Bid mistakes received more than twenty-four (24) hours after the Bid Date. 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.
- D. ACCEPTANCE OF BID (AWARD)

1. Intent to Accept. The Port intends, but is not bound, to Award a Contract to the Responsible Bidder with the lowest responsive Bid, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Port has the right to waive any informality or irregularity in any Bid(s) received and to accept the Bid which, in its judgment, is in its own best interests.
2. Requirements for Award. Before the Award, the lowest responsive Bidder must be deemed Responsible by the Port and must satisfy all Award Requirements.

E. BID PROTEST PROCEDURES

1. Procedure. A Bidder protesting, for any reason, the Bidding Documents, a Bidding procedure, the Port's objection to a Bidder or a person or entity proposed by the Bidder, including but not limited to, a finding of non-Responsibility, the Award of the Contract or any other aspect arising from, or relating in any way to, the Bidding, shall cause a written protest to be filed with the Port within two (2) business days of the event giving rise to the protest. (Intermediate Saturdays, Sundays, and legal holidays are not counted as business days.) The written protest shall include the name of the protesting Bidder, the bid solicitation number and title under which the protest is submitted, a detailed description of the specific factual and legal grounds for the protest, copies of all supporting documents, evidence that the apparent low bidder has been given notice of the protest, and the specific relief requested. The written protest shall be sent by email to procurement@portoftacoma.com.
2. Consideration. Upon receipt of the written protest, the Port will consider the protest. The Port may, within three (3) business days of the Port's receipt of the protest, provide any other affected Bidder(s) the opportunity to respond in writing to the protest. If the protest is not resolved by mutual agreement of the protesting Bidder and the Port, the Contracts Director of the Port, or his or her designee, will review the issues and promptly furnish a final and binding written decision to the protesting Bidder, and any other affected Bidder(s), within six (6) business days of the Port's receipt of the protest. (If more than one (1) protest is filed, the Port's decision will be provided within six (6) business days of the Port's receipt of the last protest.) If no reply is received from the Port during the six (6) business-day period, the protest will be deemed rejected.
3. Waiver. Failure to comply with these protest procedures will render a protest waived.
4. Condition Precedent. Timely and proper compliance with, and exhaustion of, these protest procedures shall be a condition precedent to any otherwise permissible judicial consideration of a protest.

1.06 POST BID INFORMATION

A. THE LOWEST RESPONSIVE BIDDER SHALL:

1. Responsibility Detail Form. Within 24 hours of the Low Responsive Bidder Selection Notification, the apparent low Bidder shall submit to the Port the Responsibility Detail Form and other required documents (Section 00 45 13) executed by an authorized company officer. As requested from the Port, the low responsive Bidder shall provide written confirmation that the person signing the Bid on behalf of the Bidder was duly authorized at the time of bid, a detailed breakdown of the Bid in a form acceptable to the Port, and other information required by the Port.
2. The apparent low Bidder shall submit to the Port upon request:

- a. Additional information regarding the use of the Bidder's own forces and the use of subcontractors and suppliers;
 - b. The names of the persons or entities (including a designation of the Work to be performed with the Bidder'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 (i.e., either a listed Sub-Bidder or a Sub-Bidder performing Work valued at least ten (10) percent of the Base Bid), consistent with the listing required with the Bid; and
 - c. The proprietary names and the suppliers of the principal items or systems of materials and equipment proposed for the Work.
3. Failure to provide any of the above information in a timely manner will constitute an event of breach permitting forfeiture of the Bid security.
 4. Bidder Responsibility. The Bidder will be required to establish, to the satisfaction of the Port, the reliability and responsibility of itself and the persons or entities proposed to furnish and perform the Work described in the Bidding Documents. If requested, the Bidder shall meet with the Port to discuss the Bid, including any pricing, the Bid components, and any assumptions made by the Bidder.
 5. Sub-Bidder Responsibility. The Responsibility of the Bidder may be judged in part by the Responsibility of Sub-Bidders. Bidders must verify the Responsibility Criteria for each first-tier Sub-Bidder. A Sub-Bidder of any tier that hires other Sub-Bidders must verify Responsibility Criteria for each of its lower-tier Sub-Bidders. The verification shall include a representation that each Sub-Bidder, at the time of subcontract execution, is Responsible and possesses required licenses.
 6. Objection. Prior to an Award of the Contract, the Port will notify the Bidder in writing if the Port, after due investigation, has reasonable objection to the Bidder or a person or entity proposed by the Bidder. Upon receiving such objection, the Bidder may, at Bidder's option: (a) withdraw their Bid, (b) 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 such substitution, or (c) file a protest in accordance with the Bidding Documents.
 7. Change. Persons and entities proposed by the Bidder to whom the Port has 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 Port.
 8. Right to Terminate. The Bidder's representations concerning its qualifications will be construed as a covenant under the Contract. If a Bidder makes a material misrepresentation on a Qualification Statement, the Port has the right to terminate the Contract for cause and may then pursue any remedies that exist under the Contract or that are otherwise available.
- B. INFORMATION FROM OTHER BIDDERS: All other Bidders designated by the Port as under consideration for Award of a Contract shall also provide a properly executed Qualification Statement, if so requested by the Port.

1.07 PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND, AND INSURANCE

- A. **BOND REQUIREMENTS.** Within ten (10) days after the Port's Notice of Award of the Contract, the successful Bidder shall obtain and furnish 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. Bonds shall be written for one hundred (100) percent of the contract award amount, plus Washington State Sales Tax and Change Orders. The cost of such bonds shall be included in the Base Bid.
 - 1. On contracts of one hundred fifty thousand dollars (\$150,000) or less, at the option of the Contractor or the General Contractor/Construction Manager as defined in RCW 39.10.210, the Port may, in lieu of the bond, retain ten (10) percent of the contract amount for a period of thirty days after date of final acceptance, or until receipt of all necessary releases from the department of revenue, the employment security department, and the department of labor and industries and settlement of any liens filed under RCW 60.28, whichever is later. The recovery of unpaid wages and benefits must be the first priority for any actions filed against retainage held by a state agency or authorized local government.
 - 2. On contracts of one hundred fifty thousand dollars (\$150,000) or less, the Port may accept a full payment and performance bond from an individual surety or sureties.
- B. **TIME OF DELIVERY AND FORM OF BONDS.** The successful Bidder shall deliver an original copy of the required bonds to the Port, 1 Sitcum Plaza, Tacoma, WA 98421, within the time specified in the Contract Documents.
- C. **INSURANCE.** The successful Bidder shall deliver a certificate of insurance from the Bidder's insurance company that meets or exceeds all requirements of the Contract Documents.
- D. **GOVERNMENTAL REQUIREMENTS.** Notwithstanding anything in the Bidding or Contract Documents to the contrary, the Bidder shall provide all bonding, insurance, and permit documentation as required by governmental authorities having jurisdiction for any portions of the Project.

1.08 FORM OF AGREEMENT

- A. **FORM TO BE USED.** The Contract for the Work will be written on the form(s) contained in the Bidding Documents, including any General, Supplemental, or Special Conditions, and the other Contract Documents included with the project manual.
- B. **CONFLICTS.** 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.
- C. **CONTRACT DELIVERY.** Within ten (10) days after Notice of Award, the Bidder shall submit a signed Contract to the Port in the form tendered to the Bidder and without modification.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for substitutions.

1.02 DEFINITIONS/CLARIFICATIONS

- A. Substitutions. Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- B. The Contract Documents include performance specifications for products and equipment which meet Project requirements. In those cases where a representative item or manufacturer is named in the specification, it is provided for the sole purpose of identifying a product meeting the required functional performance, and where the words "or equal" are used, a substitution request as further described, is not required.
- C. Where non-competitive or sole source products or manufacturers are explicitly specified with the words "or approved equal," or "Engineer approved equal," or "as approved by the Engineer" are used, they shall be taken to mean "or approved equal." In these cases a substitution request as further described in this Section, is required.

1.03 SUBMITTALS

- A. Substitution Request Form. Use copy of form located at the end of this Section.
- B. Pre-Bid Substitution Requests. Submit one (1) PDF of the Substitution Request Form along with all supporting documentation for consideration of each request. Identify product, fabrication, or installation method to be replaced. Include Drawing numbers and titles. Substitution requests prior to the Bid Date may originate directly from a prime Bidder, or from a prospective Sub-Bidder.
 - 1. Documentation. Show compliance with requirements for substitutions with the following, as applicable:
 - a. Statement indicating why specified product, fabrication, or installation cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work that will be necessary to accommodate proposed substitution.
 - c. Product Data, including drawings and descriptions of products, fabrication, and installation procedures.
 - d. Samples, where applicable or requested.
 - e. Certificates and qualification data, where applicable or requested.
 - f. Research reports evidencing compliance with building code in effect for the Project.
 - 2. Engineer's Action. Engineer will review substitution requests if received through the Procurement and Question Submission Portal at least seven (7) days prior to the Bid Date (Portal link is accessible via this specific procurements website. See left side of page.) A direct link is also available here: [Procurement and Question Portal Link](#). No oral responses will be binding by the Port.
 - a. Forms of Acceptance. Substitution requests will be formally accepted via written addendum prior to the Bid Date. Bidders shall not rely upon approvals made in any other manner.

- b. Use product originally specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.
- c. The Port's decision of approval or disapproval of a proposed substitution shall be final.

Instructions for utilizing the portal can be found here: [Procurement and Question Submission Portal Instructions](#).

- C. Post-Award Substitution Requests must be submitted by the Contractor and not a Subcontractor nor Supplier.
 - 1. Documentation. Show compliance with requirements for substitutions with the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification Section. Significant qualities may include, but are not limited to, attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses. Also provide names and addresses of the applicable architect, engineer, and owner.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for the Project.
 - j. Comparison of the approved Baseline Project Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Engineer's Action. If necessary, Engineer will request additional information or documentation for evaluation within seven (7) calendar days of receipt of a request for substitution. Engineer will notify Contractor through Port of acceptance or rejection of proposed substitution within fifteen (15) calendar days of receipt of request, or seven (7) calendar days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance. Change Order or Minor Change in Work.
 - b. Use product originally specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.
3. Substitutions for Cause. Submit requests for substitution immediately upon discovery of need for change, but not later than fourteen (14) days prior to date required for preparation and review of related submittals.
 - a. Conditions. Engineer will consider Contractor's request for substitution when the following conditions are satisfied:
 - 1) Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - 2) Requested substitution will not adversely affect the Baseline Project Schedule.
 - 3) Requested substitution has received necessary approvals of authorities having jurisdiction.
 - 4) Requested substitution is compatible with other portions of the Work.
 - 5) Requested substitution has been coordinated with other portions of the Work.
 - 6) Requested substitution provides specified warranty.
 - 7) If requested substitution involves more than one (1) contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
4. Substitutions for Convenience. Engineer will consider Contractor's requests for substitution if received within fourteen (14) days after the Notice of Award.
 - a. Conditions. Engineer will consider Contractor's request for substitution when the following conditions are satisfied:
 - 1) Requested substitution offers Port a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Port must assume. Port's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Port, and similar considerations.
 - 2) Requested substitution does not require extensive revisions to the Contract Documents.
 - 3) Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - 4) Requested substitution will not adversely affect the Baseline Project Schedule.
 - 5) Requested substitution has received necessary approvals of authorities having jurisdiction.

- 6) Requested substitution is compatible with other portions of the Work.
- 7) Requested substitution has been coordinated with other portions of the Work.
- 8) Requested substitution provides specified warranty.
- 9) If requested substitution involves more than one (1) contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

D. Substitutions will not be considered when:

1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this Section.
2. Acceptance will require substantial revision of Contract Documents or other items of the Work.
3. Submittal for substitution request does not include point-by-point comparison of proposed substitution with specified product.

1.04 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

PROJECT TITLE: EBC Silverback Temporary Relocation PROJECT NO.: 101686.01

SUBMITTED BY: _____ CONTRACT NO.: POT-PA-0000000292

PRIME/SUB/SUPPLIER: _____ DATE: _____

Specification Title: _____ Section No.: _____
Description: _____ Paragraph: _____
_____ Page No.: _____

Proposed Substitution: _____

Trade Name: _____ Model No.: _____

Manufacturer: _____

Address: _____ Phone No.: _____

Installer: _____

Address: _____ Phone No.: _____

Differences between proposed substitution and specified product: _____

Point-by-Point comparative data attached - REQUIRED

Reason for not providing specified item: _____

Similar Installation:

Project: _____ A/E: _____

Address: _____

Owner: _____ Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

Supporting Data Attached:

Drawings Product Data Samples Tests Reports Other: _____

Applicable to Substitution Requests During Construction:

Proposed to Port for accepting substitution: \$ _____

Proposed substitution changes Contract Time: No Yes [Add] [Deduct] _____ # days.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay Baseline Project Schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted By: _____
Signed By: _____ Firm: _____
Address: _____

Telephone: _____ Email: _____
Attachments: _____

A/E's REVIEW AND RECOMMENDATION

- Approved Substitution
- Approved Substitution as Noted
- Reject Substitution - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

ENGINEER'S REVIEW AND ACTION

- Substitution Approved - Make submittals in accordance with this Specification Section. If during construction, prepare Change Order.
- Substitution Approved as Noted - Make submittals in accordance with this Specification Section. If during construction, prepare Change Order.
- Substitution Rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

END OF SECTION

PART 1 - GENERAL

1.01 EXISTING CONDITIONS

- A. Certain information relating to existing surface and subsurface conditions and structures is available to Bidders online at www.portoftacoma.com, but will not be part of the Contract Documents, as follows:
 - 1. Site As-built Drawings: Entitled Shipyard #3 Extension (Phase I), dated 9/15/81.

1.02 AVAILABILITY

- A. Reference Documents are available online through the Port of Tacoma's Website www.portoftacoma.com. Click on "Contracts," "Procurement," and then the Procurement Number.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section provides the notification required for disclosure of asbestos, lead-containing or other hazardous materials.

1.02 HAZARDOUS MATERIALS NOTICE

- A. The project is located at Earley Business Center (EBC), which is close to the Occidental Chemical Corporation site, which was home to chemical production, shipbuilding and military operations. Contamination from these operations is known to be present in soil and groundwater at the site and around the nearby properties. The ground water contamination plume (Oxy Plume) extends to the north from below the site to the northern end of the peninsula and under Commencement Bay, as well as to the east below the Hylebos Waterway. It goes to about 160 feet below sea level and gets deeper as it gets further away from the site. The pH plume is mostly below the site but does extend to the north under the peninsula and to the east under the Hylebos Waterway. The depth of the pH plume extends to 100 feet below sea level. It is unlikely that the contractor will encounter elevated pH, it is possible they could encounter shallow solvents. EBC is a Model Toxics Control Act (MTCA) site, and will require HAZWOPER trained workers per WAC 296-843-100(4)(c) and (4)(d)(i).

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

BIDDER'S NAME: _____

PROJECT TITLE: EBC SILVERBACK TEMPORARY RELOCATION _

The undersigned Bidder declares that it has read the Contract Documents (including documents provided by reference), understands the conditions under which the Work will be performed, has examined the Project site, and has determined for itself all situations affecting the Work herein Bid upon. Bidder proposes and agrees, if this Bid is accepted, to provide at Bidder's own expense, all labor, machinery, tools, materials, etc., including all Work incidental to, or described or implied as incidental to such items, according to the Contract Documents, and that the Bidder will complete the Work within the time stated, and that Bidder will accept in full the lump sum or unit price(s) set forth below:

ITEM NO.	DESCRIPTION OF ITEM	QTY	UOM	UNIT PRICE	EXTENDED PRICE (QTY. x UNIT PRICE)
1	Mobilization and Demobilization	1	LS		
2	Project Administration	1	LS		
3	Procurement and Installation of a Prefabricated Metal Building	1	LS		
4	Procurement and Installation of Modulares	1	LS		

TOTAL BID AMOUNT	
10.3% WASHINGTON STATE SALES TAX (WSST) ON BASE BID SUBTOTAL	
BID TOTAL (WITH WSST)	

Note: Show prices in figures only.

Evaluation of Bids. In accordance with the provisions of the Contract Documents, Bids will be evaluated to determine the lowest Base Bid Subtotal offered by a responsible Bidder submitting a responsive Bid.

Schedule of Unit Prices. The unit prices are proposed to apply only in the event of additions to, or deletions from, the work required and ordered. All prices shall include complete installation without Washington State Sales Tax. The bidder shall propose a price for each item; failure to propose a price for each item may render the bid non-responsive. The Port reserves the right to accept or reject the unit prices proposed.

Principal Subcontractors/Suppliers. For Bids greater than one million (\$1,000,000) dollars, the Bidder shall list below the name of each subcontractor or supplier to whom the Bidder proposes to subcontract the portions of the work listed below, or name itself for the work, in accordance with RCW 39.30.060.

Work to be preformed	License Number	Name of Firm
----------------------	----------------	--------------

HVAC (Heating, Ventilation, and Air Conditioning) Work		
Plumbing Work		
Electrical Work		
Structural Steel Installation		
Rebar Installation		

Non-Collusion Representation. The Bidder declares under penalty of perjury that the Bid submitted is genuine and not a sham or collusive bid, or made in the interest or on behalf of any person or firm not therein named; and further represents that the Bidder has not directly or indirectly induced or solicited any other bidder to submit a sham bid, or encouraged any other person or corporation to refrain from bidding; and that the Bidder has not in any manner sought by collusion to secure to the Bidder an advantage over any other bidder or bidders.

RCW 39.04.350 Certification. The Bidder represents and certifies, under penalty of perjury, that within the three- (3-) year period immediately preceding the Bid Date, the Bidder has not been determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries, nor through a civil judgment entered by a court of limited or general jurisdiction, to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, nor 49.52 RCW.

Addenda. Bidder acknowledges receipt and acceptance of all Addenda through No. ____ (Identify Last Addenda By Number)

Bid Security. A certified check, cashier's check, or other obligation of a bank, or a bid bond in substantially the form set forth in Section 00 43 13, Bid Security Form for at least five (5) percent of the Base Bid Subtotal, shall be submitted with this Bid.

Apprenticeship Requirements. For Bids greater than one million (\$1,000,000) dollars, the apprentice labor hours required for this project are fifteen (15) percent of the total labor hours. The Bidder agrees to utilize this level of apprentice participation.

Name of Firm

Date

Signature

By Title

Mailing Address

City, State Zip Code

Telephone Number

Email Address

WA State Contractor's License No.

Employment Security Department No.

Identification of Bidder as a sole proprietor, a partnership, a joint venture, a corporation, or another described form of legal entity

END OF SECTION

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal, and _____, as Surety, are held and firmly bound unto the PORT OF TACOMA as Obligee, in the penal sum of _____ Dollars, for the payment of which the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigned, jointly and severally, by these present.

The condition of this obligation is such that if the Obligee shall make any award to the Principal for _____, according to the terms of the proposal or bid made by the Principal therefor, and the Principal shall duly make and enter into a contract with the Obligee in accordance with the terms of said proposal or bid and award and shall give bond for the faithful performance thereof, with Surety or Sureties approved by the Obligee; or, if the principal shall, in case of failure to do so, pay and forfeit to the Obligee the penal amount of the deposit specified in the call for bids, then this obligation shall be null and void; otherwise it shall be and remain in full force and effect and the Surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED THIS _____ DAY OF _____, 20__

BY _____
PRINCIPAL

BY _____
SURETY

AGENT AND ADDRESS

Note: Bidder may submit Surety's bid bond form, provided it is similar in substance, made out in the name of the Port of Tacoma, and that the agent's name and address appear as specified. Bonds containing riders limiting responsibility for toxic waste or limiting the term of responsibility will be rejected.

END OF SECTION

THIS IS NOT TO BE SUBMITTED WITH A BID.

THE LOW RESPONSIVE BIDDER SHALL BE REQUIRED TO COMPLETE THIS RESPONSIBILITY DETAIL FORM AS SPECIFIED IN SECTION 00 21 00 - INSTRUCTIONS TO BIDDERS. **THIS COMPLETED RESPONSIBILITY DETAIL FORM SHALL BE SUBMITTED ELECTRONICALLY (PDF) VIA EMAIL TO THE CONTACT(S) IDENTIFIED IN THE LOW RESPONSIVE BIDDER SELECTION NOTIFICATION.**

BIDDER'S COMPANY NAME: _____

For the below Mandatory Bidder Responsibility Criteria, please mark the appropriate choice.

1.01 MANDATORY BIDDER RESPONSIBILITY CRITERIA

A. The Bidder shall meet the following mandatory responsibility criteria as described in RCW 39.04.350(1). The Bidder shall be rejected as not responsible if any answer to questions 1 through 5 is "No" or any answer to questions 6 through 8 is "Yes."

1. Does the Bidder have a Certificate of Registration in compliance with RCW 18.27?
 Yes No
2. Does the Bidder have a current Washington State Unified Business Identifier number?
 Yes No
3. Does the Bidder have Industrial Insurance Coverage for the Bidder's employees working in Washington State as required in RCW 51?
 Yes No
4. Does the Bidder have an Employment Security Department number as required in RCW 50?

****Attach** letter dated within six (6) months of Bid Date.*

**Request a letter electronically by clicking on the following link <https://fortress.wa.gov/esd/twt/pwcinternet/> or by emailing a request to publicworks@esd.wa.gov.*

 Yes No
5. Does the Bidder have a Washington State Excise Tax Registration number as required in RCW 82?
 Yes No
6. Has the Bidder been disqualified from bidding on any public works project under RCW 39.06.010 or 39.12.065(3)?
 Yes No
7. Has the Bidder violated RCW 39.04.370 more than one (1) time as determined by the Washington State Department of Labor and Industries?
 Yes No

- 8. Has the Bidder ever been found to be out of compliance with Apprenticeship Utilization requirements of RCW 39.04.320?
 Yes No

- 9. Has the Bidder ever been found to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, or 49.52 RCW within the three- (3-) year period immediately preceding the date of this bid solicitation?
 Yes No

- 10. Has the Bidder completed the training required by RCW 39.04.350, or is the Bidder on the list of exempt businesses maintained by the Department of Labor and Industries?
 Yes No

If any answer to questions 1 through 5 is "No" or any answer to questions 6 through 8 is "Yes" - **STOP HERE** and contact the Contract Administrator. The Bidder is not responsible for this Work. Otherwise proceed to 1.02. **Provide attached to this completed form documentation to confirm responsibility criteria.**

For remaining criteria below, check or fill-out the appropriate item. Based upon the answer provided by the Bidder, the Port may request additional information or seek further explanation. As needed, provide backup documentation for any explanations listed below.

1.02 CONTRACT AND REGULATORY HISTORY

A. The Port will evaluate whether the Bidder's contract and regulatory history demonstrates an acceptable record of past project performance and consistent responsibility. The Bidder shall answer the following questions. The Bidder may be rejected as not responsible if any answer to questions 1 through 5 below is "Yes."

- 1. Has the Bidder had a contract terminated for cause or default in the last five (5) years?
 Yes, **If YES, explain below.** No

- 2. Has the Bidder required a Surety to take over all, or a portion of, a project to cure or respond to an asserted default or material breach of contract on the part of the Bidder on any public works project in the last five (5) years?
 Yes, **If YES, explain below.** No

- 3. Have the Bidder and major Sub-Bidders been in bankruptcy, reorganization, and/or receivership on any public works project in the last five (5) years?
 Yes, **If YES, explain below.** No

4. Have the Bidder and major Sub-Bidders been disqualified by any state or local agency from being awarded and/or participating on any public works project in the last five (5) years?

- Yes, **If YES, explain below.** No

5. Are the Bidder and major Sub-Bidders currently a party to a formal dispute resolution process with the Port (i.e., a pending mediation, arbitration, or litigation)?

- Yes, **If YES, explain below.** No

1.03 ACCIDENT/INJURY EXPERIENCE

- A. The Port will evaluate the Bidder’s accident/injury Experience Modification Factor (“EMF”) from the Washington State Department of Labor and Industries to assess whether the Bidder has an acceptable safety record preventing personal injuries on projects.
- B. List the Bidder’s accident/injury EMF for the last five (5) years. An experience factor is calculated annually by the Washington State Department of Labor and Industries.

Year	Effective Year	Experience Factor
1		
2		
3		
4		
5		

If the Bidder has received an EMF of greater than 1.0 for any year, explain the cause(s) of the designation and what remedial steps were taken to correct the EMF. The Bidder may be rejected as not responsible if the Bidder’s EMF is greater than 1.0 and sufficient remedial steps have not been implemented.

1.04 WORK PERFORMED BY BIDDER

- A. The Bidder shall state the amount of the Work, as an equivalent to the Base Bid, excluding taxes, insurance, and bonding, the Bidder will execute with its own forces.

_____ %

1.05 ADDITIONAL CONTRACTOR INFORMATION

- A. As part of completing this Responsibility Detail Form, **submit the following information with the completed Responsibility Detail Form:**
 - 1. Bidder’s recent job resume, including a list of similar projects performed and contact information for the similar project owner(s), a brief description of work, start and end dates, and contract amount.
 - 2. Resumes of Bidder’s proposed project manager and job superintendent.

- B. The Bidder's failure to provide the required project information may result in a determination of the Bidder being declared non-responsible by the Port.
- C. The Bidder shall submit this completed, **SIGNED** Responsibility Detail Form electronically (PDF), with all requested backup documentation, via email to the contact(s) noted on the Low Responsive Bidder Selection Notification.
- D. The Bidder and its subcontractors to verify that its subcontractors at each tier meet the responsibility criteria as required by RCW 39.06.020 and 39.04.350.
 - 1. Bidder shall verify major subcontractors meet the responsibility criteria required. Fill out one Port of Tacoma Public Works Project Bidder Evaluation Checklist for Subcontractors for each major subcontractor and submit to the Port with this form. Backup documentation is not required to be submitted.

PROJECT: EBC Silverback Temporary Relocation

PROJECT NO.: 101686.01

CONTRACT NO.: POT-PA-0000000292

Responsibility Certification Form

The Low responsive Bidder shall complete the Responsibility Detail Form, attach all documentation, and submit to the Port within twenty-four (24) hours following receipt of the Low Responsive Bidder Selection Notification. All forms shall be submitted electronically (PDF) via email to the contact(s) listed on the Selection Notice. Note, the same project may be used to demonstrate experience across multiple categories if applicable.

By completing and signing this Responsibility Detail Form, the Bidder is certifying that the information contained within the Form, the backup documentation, and any additional information requested by the Port is true and complete. The Bidder's failure to disclose the required information or the submittal of false or misleading information may result in the rejection of the Bidder's Bid, revocation of award, or contract termination.

The information provided herein is true and complete.

Signature of Authorized Representative

Date

Print Name and Title

**PORT OF TACOMA PUBLIC WORKS PROJECT BIDDER EVALUATION CHECKLIST FOR
 SUBCONTRACTORS**

PROJECT TITLE: EBC Silverback Temporary Relocation

BIDDER: _____

CONTRACT AND PROJECT NUMBER: POT-PA-0000000292/ 101686.01

This checklist shall be completed by the Bidder and its subcontractors to verify that its subcontractors at each tier meet the responsibility criteria as required by RCW 39.06.020 and RCW 39.04.350.

This checklist should be submitted to the Port of Tacoma Contracts Administrator within twenty-four (24) hours of request.

Document verification information or backup data is not to be submitted to the Port, this information should remain on file with the Contractor and be presented to the Port if requested at a later date.

Item No.	Item	Initials/ Comments
1.	At the time of Bid submittal, have a certificate of registration in compliance with RCW 18.27: Check the L&I site https://fortress.wa.gov/lni/bbip/ . Verify that a subcontractor has an electrical contractor license, if required by RCW 19.28, or an elevator contractor license, if required by RCW 70.87.	
2.	While reviewing registration information above, also check contractor's Employer Liability Certificate to verify workers' comp (industrial insurance) premium status – current account. Complete a "Submit Contractor Tracking Request" to be notified if the contractor fails to pay workers' comp premiums or renew their contractor registration or if their electrical contractor license is suspended or revoked within one year.	
3.	State excise tax registration number (Department of Revenue). (contractor's Washington State Unified Business Identifier and tax registration number) http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/ .	
4.	Not disqualified from bidding on any public works contract under RCW 39.06.010 or RCW 39.12.065(3) . Check the Department of Labor and Industries http://www.lni.wa.gov/TradesLicensing/PrevWage/AwardingAgencies/DebarredContractors/ .	
5.	Verify subcontractors are registered with the Washington State Employment Security Department (ESD) and have an account number. Request a letter to be sent from the subcontractor electronically by clicking on the following link https://fortress.wa.gov/esd/twt/pwcinternet/ or by emailing a request to publicworks@esd.wa.gov . Include ESD#, UBI#, and business name in the email. Certificate of Coverage letter issued/dated within the last six (6) months. Document if subcontractor confirms in writing, under penalty of perjury, that it has no	

Item No.	Item	Initials/ Comments
	employees and this requirement does not apply.	

END OF SECTION

THIS AGREEMENT is made and entered into by and between the PORT OF TACOMA, a State of Washington municipal corporation, hereinafter designated as the "Port," and:

The "Contractor" is: _____ (Legal Name)

_____ (Address)

_____ (Address 2)

_____ (Phone No.)

The "Project" is: **EBC Silverback Temporary Relocation** _____ (Title)

101686.01 | POT-PA-0000000292 _____ (Project/Contract No.)

401 Alexander Ave, Tacoma, WA 98421 (Project Address)

The "Engineer" is: **Thais Howard, PE** _____ (Engineer)

Director of Engineering _____ (Title)

thoward@portoftacoma.com _____ (Email)

(253) 888-4718 _____ (Phone No.)

The "Contractor's Representative" is: _____ (Representative)

_____ (Title)

_____ (Email)

_____ (Phone No.)

BACKGROUND AND REPRESENTATIONS:

The Port publicly solicited bids on the Contract Documents. The Contractor submitted a Bid to the Port on the _____ day of _____, 20__ to perform the Work.

The Contractor represents that it has the personnel, experience, qualifications, capabilities, and means to accomplish the Work in strict accordance with the Contract Documents, within the Contract Time and for the Contract Price, and that it and its Subcontractors satisfy the responsibility criteria set forth in the Contract Documents, including any supplemental responsibility criteria.

The Contractor further represents that it has carefully examined, and is fully familiar with, all provisions of the Contract Documents, including any Addenda, that it has fully satisfied itself as to the nature, location, difficulty, character, quality, and quantity of the Work required by the Contract Documents and the conditions and other matters that may be encountered at or near the Project site(s), or that may affect performance of the Work or the cost or difficulty thereof, including all applicable safety and site responsibilities, and that it understands and can satisfy all scheduling and coordination requirements and interim milestones.

AGREEMENT:

The Port and the Contractor agree as follows:

1.0 CONTRACTOR TO FULLY PERFORM THE WORK

The Contractor shall fully execute and complete the entire Work for the Project described in the Contract Documents, except to the extent specifically indicated in the Agreement, the General Conditions of the Contract (as well as any Supplemental, Special, or other conditions included in the Project Manual), the Drawings, the Specifications, and all Addenda issued prior to, and all modifications issued after, execution of the Contract.

2.0 DATE OF COMMENCEMENT

The date of commencement of the Work, which is the date from which the Contract Time is measured, shall be fixed as the date of execution of the Contract.

3.0 CONTRACT TIME AND LIQUIDATED DAMAGES

The Contractor shall achieve all interim milestones as set forth in the Contract Documents and Substantial Completion of the entire Work not later than 350 calendar days from execution of the Contract, subject to adjustments of this Contract Time as provided in the Contract Documents. The Contractor shall achieve Final Completion of the entire Work within 30 calendar days of the date on which Substantial Completion is achieved.

Provisions for liquidated damages as a reasonable estimate of future loss, as of the date of this Agreement, are included in the Contract Documents. The parties agree that the stated liquidated damages are reasonable and not penalties individually nor cumulatively.

The liquidated damages for failure to achieve Substantial Completion by the required date shall be \$675 per calendar day. After the required Final Completion date, the liquidated damages for failure to achieve Final Completion shall be \$112 per calendar day.

Liquidated damages assessed by the Port will be deducted from monies due to the Contractor, or from monies that will become due to the Contractor. The liquidated damages, as specified and calculated herein, shall be levied, cumulatively if applicable, for each and every calendar day that Substantial Completion and/or Final Completion of the Work is delayed beyond the required completion dates, or the completion dates modified by the Port for extensions of the Contract Time.

4.0 CONTRACT PRICE

In accordance with the Contractor's Bid dated _____, the Port shall pay the Contractor in current funds for the Contractor's performance of the Contract, the Contract Price of _____ Dollars (\$ _____), subject to additions and deductions as provided in the Contract Documents. State and local sales tax is not included in the Contract Price, but will be due and paid by the Port with each progress payment.

6.0 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in the Contract Documents.

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

CONTRACTOR

PORT OF TACOMA

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Execution _____

Date:

END OF SECTION

PERFORMANCE BOND # _____

CONTRACTOR (NAME AND ADDRESS)

SURETY (NAME AND PRINCIPLE PLACE OF BUSINESS)

OWNER (NAME AND ADDRESS)

AGENT OR BROKER (FOR INFORMATION ONLY)

PORT OF TACOMA
P.O. BOX 1837
TACOMA, WA 98401-1837

KNOW ALL MEN BY THESE PRESENTS:

That _____ as Principal, hereinafter called Contractor, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto the Port of Tacoma as Obligee, hereinafter called the Port, in the amount of _____ Dollars (\$ _____) for the payment whereof Contractor and Surety bind themselves, their executors, administrators, legal representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS:

Contractor shall execute an agreement with the Port for EBC Silverback Temporary Relocation, Project No. 101686.01/Contract No. POT-PA-0000000292, a copy of which Contract is by reference made a part hereof (the term "Contract" as used herein to include the aforesaid agreement together with all the Contract Documents, addenda, modifications, all alterations, additions thereto, deletions therefrom, and any other document or provision incorporated into the Contract) and is hereinafter referred to as the Contract.

This bond is executed and issued pursuant to the provisions of RCW 39.08.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

FURTHER:

- A. Surety hereby waives notice of any alterations, change orders, modifications, or extensions of time made by the Port.
- B. Surety recognizes that the Contract includes provisions for additions, deletions, and modifications to the Work and/or Contract Time and the amounts payable to the Contractor. Subject to the limitations contained in (A) above, Surety agrees that no such addition, deletion, or modification, or any combination thereof, shall avoid or impair Surety's obligation hereunder.
- C. Whenever Contractor has been declared by the Port to be in default, and the Port has given Surety notice of the Port's determination of such default, Surety shall promptly (in no event more than fifteen (15) days following receipt of such notice) advise the Port of its intended action to:
 - 1. Remedy the default within fifteen (15) days following its advice to the Port as set forth above, or

- 2. Assume within fifteen (15) days, following its advice to the Port as set forth above, completion of the Contract in accordance with the Contract Documents and become entitled to payment of the balance of the Contract Sum, or
- 3. Pay the Port upon completion of the Contract, in cash, the cost of completion together with all other reasonable costs and expenses incurred by the Port as a result of the Contractor's default, including but not limited to, those reasonable costs and expenses incurred by the Port in its efforts to mitigate its losses, which may include, but are not limited to, attorney's fees and efforts to complete the Work prior to the Surety exercising the options available to it as set forth herein.
- D. If the Port shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgment, shall pay all costs and attorney's fees incurred by the Port in enforcement of its rights hereunder. Venue for any action arising out of, or in connection with, this bond shall be in Pierce County, Washington.
- E. No right or action shall accrue on this bond to, or for the use of, any person or corporation other than the Port of Tacoma.

Signed and Sealed the _____ day of _____, 20____.

IMPORTANT: Surety companies executing bonds must have an A.M. Best Rating of "A-, FSC (6)" or higher, have an underwriting limitation of not less than the Contract Sum, and be authorized to transact business in the State of Washington.

SURETY

CONTRACTOR

Signature

Signature

Printed Name and Title

Printed Name and Title

Power of Attorney attached.

END OF SECTION

LABOR AND MATERIAL PAYMENT BOND # _____

CONTRACTOR (NAME AND ADDRESS)

SURETY (NAME AND PRINCIPLE PLACE OF BUSINESS)

OWNER (NAME AND ADDRESS)

AGENT OR BROKER (FOR INFORMATION ONLY)

PORT OF TACOMA
P.O. BOX 1837
TACOMA, WA 98401-1837

KNOW ALL MEN BY THESE PRESENTS:

That _____ as Principal, hereinafter called Contractor, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto the Port of Tacoma as Obligee, hereinafter called the Port, and all others entitled to recovery hereunder, in the amount of _____ Dollars (\$ _____) for the payment whereof Contractor and Surety bind themselves, their executors, administrators, legal representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS:

Contractor shall execute an agreement with the Port for EBC Silverback Temporary Relocation, Project No. 101686.01/Contract No. POT-PA-0000000292, a copy of which Contract is by reference made a part hereof (the term "Contract" as used herein to include the aforesaid agreement together with all the Contract Documents, addenda, modifications, alterations, additions thereto, deletions therefrom, and any other document or provision incorporated into the Contract) and is hereinafter referred to as the Contract.

This bond is executed pursuant to the provisions of RCW 39.08.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly make payment to all claimants, as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract and shall indemnify and save the Port harmless from all cost and damage by reason of Contractor's default, then this obligation shall be null and void; otherwise, it shall remain in full force and effect, subject to the following conditions.

- A. Surety hereby waives notice of any alterations, change orders, modifications, or extensions of time made by the Port.
- B. Surety recognizes that the Contract includes provisions for additions, deletions, and modifications to the Work and/or Contract Time and the amounts payable to the Contractor. Subject to the limitations contained in (A) above, Surety agrees that no such addition, deletion, or modification, or any combination thereof, shall avoid or impair Surety's obligation hereunder.

- C. Surety hereby agrees that every person protected under the provisions of RCW 39.08.010 who has not been paid as provided under the Contract, and pursuant to RCW 39.08.010, less any amounts withheld pursuant to statute, and less retainage withheld pursuant to RCW 60.28, after the expiration of a period of thirty (30) days after the date on which the completion of the Contract in accordance with RCW 39.08, may sue on this bond, prosecute the suit to final judgment as may be due claimant, and have execution thereon including recovery of reasonable costs and attorney's fees as provided by RCW 39.08. The Port shall not be liable for the payment of any costs or expenses of any such suit.
- D. No suit or action shall be commenced hereunder by any claimant unless claimant shall have given the written notices to the Port, and where required, the Contractor, in accordance with RCW 39.08.030.
- E. The amount of this bond shall be reduced by, and to the extent of, any payment or payments made in good faith hereunder, inclusive of the payment by Surety of claims which may be properly filed in accordance with RCW 39.08 whether or not suit is commenced under and against this bond.
- F. If any Claimant shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgment and attorney fees as provided by RCW 39.08.030, shall also pay such costs and attorney fees as may be incurred by the Port as a result of such suit. Venue for any action arising out of, or in connection with, this bond shall be in Pierce County, Washington.

Signed and Sealed the _____ day of _____, 20_____.

IMPORTANT: Surety companies executing bonds must have an A.M. Best Rating of "A-, FSC (6)" or higher, have an underwriting limitation of not less than the Contract Sum, and be authorized to transact business in the State of Washington.

SURETY

CONTRACTOR

Signature

Signature

Printed Name and Title

Printed Name and Title

Power of Attorney attached.

END OF SECTION

BOND NO.: _____

PROJECT TITLE: EBC Silverback Temporary Relocation

PROJECT NO.: 101686.01 _____

CONTRACT NO.: POT-PA-0000000292

KNOW ALL MEN BY THESE PRESENTS: That we, _____
_____ a corporation existing under and by virtue of the laws of the State of Washington and authorized to do business in the State of Washington, as Principal, and _____, a corporation organized and existing under the laws of the State of _____ and authorized to transact the business of surety in the State of Washington, as Surety, are jointly and severally held and bound unto the PORT OF TACOMA, hereinafter called Port, as Obligee, and are similarly held and bound unto the beneficiaries of the trust fund created by RCW 60.28 as their heirs, executors, administrators, successors, and assigns in the penal sum of _____ (\$ _____) plus five (5) percent of any increases in the Contract Price that have occurred or may occur, due to change orders, increases in the quantities, or the addition of any new item of work.

WHEREAS, on the _____ day of _____, the said Principal herein executed Contract No. POT-PA-0000000292 with the Port for EBC Silverback Temporary Relocation, Project No. 101686.01.

WHEREAS, said Contract and RCW 60.28 require the Port to withhold from the Principal the sum of five (5) percent from monies earned by the Principal on estimates during the progress of the work, hereinafter referred to as earned retained funds.

WHEREAS, the Principal has requested that the Port accept a bond in lieu of earned retained funds as allowed under RCW 60.28.

NOW THEREFORE, this obligation is such that the Surety, its successors, and assigns are held and bound unto the Port and unto all beneficiaries of the trust fund created by RCW 60.28.011(1) in the aforesaid sum. This bond, including any proceeds therefrom, is subject to all claims and liens and in the same manner and priority as set forth for retained percentages in RCW 60.28. The condition of this obligation is also that if the Principal shall satisfy all payment obligations to persons who may lawfully claim under the trust fund created pursuant to RCW 60.28, to the Port, and indemnify and hold the Port harmless from any and all loss, costs, and damages that the Port may sustain by release of said retainage to Principal, then this obligation shall be null and void, provided the Surety is notified by the Port that the requirements of RCW 60.28.021 have been satisfied and the obligation is duly released by the Port.

IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable under this obligation as Principal. The Surety will not be discharged or released from liability for any act, omission, or defenses of any kind or nature that would not also discharge the Principal.

IT IS HEREBY FURTHER DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of the Principal, the Surety, the Port, the beneficiaries of the trust fund created by RCW 60.28 and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, said Principal and said Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20____.

By: _____
Principal

Address: _____
City/ST/Zip: _____
Phone: _____

Surety Name: _____
By: _____
Attorney-In-Fact

Address: _____
City/ST/Zip: _____
Phone: _____

IMPORTANT: Surety companies executing bonds must have an A.M. Best Rating of "A-, FSC (6)" or higher, and be authorized to transact business in the State of Washington.

END OF SECTION

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ARTICLE 1 - THE CONTRACT DOCUMENTS

1.01 GENERAL

- A. Contract Documents form the Contract. The Contract Documents are enumerated in the Agreement between the Port and Contractor ("Agreement"). Together, the Contract Documents form the Contract. The Contract represents the entire integrated agreement between the parties and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only in writing and only as set forth in the Contract Documents.
- B. Headings only for convenience. The titles or headings of the sections, divisions, parts, articles, paragraphs, and subparagraphs of the Contract Documents are intended only for convenience.

1.02 DEFINITIONS

- A. "Contract Documents" proposed for the Work consist of the Agreement, the General Conditions of the Contract (as well as any Supplemental, Special, or other conditions included in the Project Manual), the Drawings, the Specifications, and all Addenda issued prior to, and all modifications issued after, execution of the Contract.
- B. "Contractor" means the person or entity contracting to perform the Work under these Contract Documents. The term Contractor includes the Contractor's authorized representative for purposes of identifying obligations and responsibilities under the Contract Documents, including the ability to receive notice and direction from the Port.
- C. "Day" means a calendar day unless otherwise specifically designated.
- D. "Drawings" are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, including plans, elevations, sections, details, and diagrams.
- E. "Engineer" is the Port employee generally tasked with administering the Project on the Port's behalf and the person with overall responsibility for managing, for the Port, the Project scope, budget, and schedule. To the extent empowered, the Engineer may delegate to others at the Port (such as a Project Manager or Inspector) the responsibility for performing delegated responsibilities of the Engineer's under this Contract.
- F. "Port" means the Port of Tacoma. The Port will designate in writing a representative (usually the Engineer) who shall have the authority to act on the Port's behalf related to the Project. The "Port" does not include staff, maintenance, or safety workers, or other Port employees or consultants that may contact the Contractor or be present at the Project site.
- G. "Project" is identified in the Agreement and is the total construction to be performed by or through the Port, of which the Work performed under the Contract Documents may be only a part.
- H. "Specifications" are those portions of the Contract Documents that specify the written requirements for materials, equipment, systems, standards, and workmanship for the Work and for the performance of related services.
- I. "Subcontractor" means a person or entity that contracts directly with the Contractor to perform any Work under the Contract Documents. "Subcontractor of any tier" includes Subcontractors as well as any other person or entity, including suppliers, that contracts with a Subcontractor or a lower-tier Subcontractor (also referred to as "Sub-subcontractors") to perform any of the Work.

- J. "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, tools, equipment, materials, services, and incidentals necessary to complete all obligations under the Contract Documents. The Work may constitute only a part of the Project, and may interface and need to be coordinated with the work of others.

1.03 INTENT OF THE CONTRACT DOCUMENTS

- A. Intent of Contract Documents. The intent of the Contract Documents is to describe the complete Work and to include all items and information necessary for the proper execution and completion of the Work by the Contractor.
- B. Contract Documents are complementary. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor is required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.
- C. No third party contract rights. The Contract Documents shall not create a contractual relationship of any kind (1) between the Port and a Subcontractor of any tier (although the Port does not waive any third-party beneficiary rights it may otherwise have as to Subcontractors of any tier), (2) between the Contractor and the Engineer or other Port employees or consultants, or (3) between any persons or entities other than the Port and Contractor.

1.04 CORRELATION OF THE CONTRACT DOCUMENTS

- A. Precedence. In the event of a conflict or discrepancy between or among the Contract Documents, the conflict or discrepancy will be resolved by the following order of precedence: with an addendum or Change Order having precedence over an earlier document, and computed dimensions having precedence over scaled dimensions, and large scale drawings take precedence over small scale drawings:
 - 1. The signed Agreement
 - a. Supplemental Conditions
 - b. Division 00 General Conditions
 - c. Division 01 General Requirements of Specifications
 - d. All other Specifications, including all remaining divisions, material and system schedules and attachments, and Drawings
 - e. All other sections in Division 00 not specifically identified herein by Section
- B. Inconsistency between or among Contract Documents. If there is any inconsistency between the Drawings, schedules, or Specifications, or any attachments, the Contractor will make an inquiry to the Engineer to determine how to proceed, and, unless otherwise directed, the Contractor will provide the better quality or greater quantity of any work or materials, as reasonably interpreted by the Port, at no change in the Contract Sum or Contract Time. Thus, if Work is shown on Drawings, but not contained in Specifications or schedules, or contained in Specifications or schedules, but not shown on the Drawings, the Work as shown or contained will be provided at no change in the Contract Sum or Contract Time, according to Specifications or Drawings to be issued by the Port.

- C. Inconsistency with law. In the event of a conflict between the Contract Documents and applicable laws, codes, ordinances, regulations, or orders of governmental authorities having jurisdiction over the Work, or in the event of any conflict between such laws, the most stringent requirements govern.
- D. Organization of Contract Documents. The organization of the Specifications and Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of the Work to be performed. The Port assumes no responsibility for the division and proper coordination of Work between particular Subcontractors.
- E. Bid quantities are estimates only. Any "bid quantities" set forth in the Contract Documents are estimates only. The Port does not warrant that the actual amount of Work will correspond to any estimates. The basis of payment will be the actual quantities performed in accordance with the Contract Documents.

1.05 OWNERSHIP OF THE CONTRACT DOCUMENTS

- A. Port owns all Contract Documents. All Drawings, Specifications, and other Contract Documents furnished to the Contractor are Port property, and the Port retains all intellectual property rights, including copyrights. The Contract Documents are to be used only with respect to the Project.

ARTICLE 2 - PORT OF TACOMA

2.01 AUTHORITY OF THE ENGINEER

- A. Engineer will be Port's representative. The Engineer or the Engineer's designee will be the Port's representative during the Project and will administer the Project on the Port's behalf.
- B. Engineer may enforce all obligations. The Engineer has the authority to enforce all requirements imposed on the Contractor by the Contract Documents.
- C. Only Engineer is agent of Port. Other than the Engineer, no other Port employee or consultant is an agent of the Port, and none are authorized to agree on behalf of the Port to changes in the Contract Sum or Contract Time, nor to waive provisions of the Contract Documents, nor to direct the Contractor to take actions that change the Contract Sum or Contract Time, nor to accept notice of protests or claims on behalf of the Port.

2.02 ADMINISTRATION OF THE CONTRACT

- A. Port will administer Contract. The Port will provide administration of the Contract through the Engineer or the Engineer's designee. All communications with the Port or its consultants related to the Contract will be through the designated representative.
- B. Port not responsible for means and methods. The Port is not responsible for, and will have no control or charge of, the means, methods, techniques, sequences, or procedures of construction, or for safety precautions or programs incidental thereto, because these are the sole responsibility of the Contractor. If the Port makes any suggestion of means, methods, techniques, sequences, or procedures, the Contractor will exercise its independent judgment in deciding whether to adopt the suggestion, except as otherwise provided in the Contract Documents.
- C. Port not responsible for acts or omissions of Contractor or Subcontractors. The Port is not responsible for, and will have no control or charge of, the acts or omissions of the Contractor, Subcontractors of any tier, suppliers, or any of their agents or employees, or any other persons performing a portion of the Work.

- D. Port not responsible for the Work. The Port is not responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The presence of the Engineer or others at the Project site at any time does not relieve the Contractor from its responsibility for non-conforming Work.
- E. Port will have access to the Work. The Port and its representatives will at all times have access to the Work in progress, and the Contractor will provide proper facilities for such access and for inspection.

2.03 INFORMATION PROVIDED BY THE PORT

- A. Port to furnish information with reasonable promptness. The Port shall furnish information and services required of the Port by the Contract Documents with reasonable promptness.
- B. Subsurface investigation. The Port may have undertaken a limited investigation of the soil and other subsurface conditions at the Project site for design purposes only. The results of these investigations will be available for the convenience of the Contractor, but they are not Contract Documents. There is no warranty or guarantee, express or implied, that the conditions indicated are representative of those existing at the site or that unforeseen developments may not occur. The Contractor is solely responsible for interpreting the information.

2.04 CONTRACTOR REVIEW OF PROJECT INFORMATION

- A. Contractor to familiarize itself with site and conditions of Work. Prior to executing the Contract, the Contractor shall visit the site, become generally familiar with local conditions under which the Work is to be performed, and correlate personal observations with the requirements of the Contract Documents and all information provided with the Bid Documents. By signing the Contract, the Contractor confirms that the Contract Sum is reasonable compensation for the Work; that the Contract Time is adequate; that it has carefully examined the Contract Documents and the Project site; and that it has satisfied itself as to the nature, location, and character of the Work, the labor, materials, equipment, and other items required and all other requirements of the Contract Documents. The Contractor's failure fully to acquaint itself with any such condition does not relieve the Contractor from the responsibility for performing the Work in accordance with the Contract Documents, within the Contract Time, and for the Contract Sum.
- B. Contractor to review Contract Documents. Because the Contract Documents are complementary, the Contractor will, before starting each portion of the Work, carefully study and compare the various Drawings, Specifications, and other Contract Documents, as well as all information furnished by the Port.
- C. Contractor to confirm field conditions. Before starting each portion of the Work, the Contractor shall take field measurements of and verify any existing conditions, including all Work in place, and all general reference points; shall observe any conditions at the site affecting the Contractor; and shall carefully compare field measurements, conditions and other information known to the Contractor with the Contract Documents.

2.05 PORT'S RIGHT TO REJECT, STOP, AND/OR CARRY-OUT THE WORK

- A. Port may reject Work. The Port has the authority, but not the obligation, to reject work, materials, and equipment that is defective or that otherwise does not conform to the Contract Documents, and to decide questions concerning the Contract Documents. However, the failure to so reject, or the presence of the Port at the site, shall not be construed as assurance that the Work is acceptable or being completed in compliance with the Contract Documents.

- B. Port may stop Work. If the Contractor fails to correct Work that does not comply with the requirements of the Contract Documents, or repeatedly or materially fails to properly carry out the Work, the Port may issue an order to stop all or a portion of the Work until the cause for the order has been eliminated. The Port's right to stop the Work shall not impose a duty on the Port to exercise this right for the benefit of the Contractor or any third party.
- C. Port may carry-out Work. If the Contractor fails to perform the Work properly, fails to perform any provision of this Contract, or fails to maintain the Baseline Project Schedule, or if the Port reasonably concludes that the Work will not be completed in the specified manner or within the Contract Time, then the Port may, after three (3) days' written notice to the Contractor and without prejudice to any other remedy the Port may have, perform itself or have performed any or all of the Work and may deduct the cost thereof from any payment then or later due the Contractor.

2.06 SEPARATE CONTRACTORS

- A. Port may engage separate contractors or perform work with its own forces. The Port may contract with other contractors ("Separate Contractor") in connection with the Project or perform work with its own forces. The Contractor shall coordinate and cooperate with any Port forces or Separate Contractors, as applicable. The Contractor shall provide reasonable opportunity for the introduction and storage of materials and the execution of work by others.
- B. Contractor to inspect work of others. If any part of the Contractor's Work depends on the work of the Port or any Separate Contractor, the Contractor shall inspect and promptly report to the Port, in writing, any defects that impact the Contractor. Failure of the Contractor to so inspect and report defects in writing shall constitute an acceptance by Contractor of the work of the Port or Separate Contractor.
- C. Contractor to resolve claims of others. Should the Contractor, or any of its Subcontractors of any tier, cause damage of any kind, including but not limited to delay, to any Separate Contractor, the Contractor shall promptly, and using its best efforts, settle or otherwise resolve the dispute with the Separate Contractor. The Contractor shall also promptly remedy damage caused to completed or partially completed construction.

2.07 OFFICERS AND EMPLOYEES OF THE PORT

- A. No personal liability. Officers, employees, and representatives of the Port, including the Commissioners, acting within the scope of their employment, shall not be personally liable to Contractor for any acts or omissions arising out of the Project.

ARTICLE 3 - CONTRACTOR'S RESPONSIBILITIES

3.01 DUTY TO PERFORM THE ENTIRE WORK

- A. Contractor must perform entire Work in accordance with Contract Documents. The Contractor shall perform the entire Work required by the Contract in accordance with the Contract Documents. Unless otherwise specifically provided, the Contractor shall provide and pay for all labor, tools, equipment, materials, electricity, power, water, other utilities, transportation, and other facilities necessary for the execution and completion of the Work.
- B. Contractor shall be independent contractor. The Contractor shall be, and operate as, an independent contractor in the performance of the Work. The Contractor is not authorized to enter into any agreements or undertakings for, or on behalf of, the Port and is not an agent or employee of the Port.

3.02 OBSERVED ERRORS, INCONSISTENCIES, OMISSIONS, OR VARIANCES IN THE CONTRACT DOCUMENTS

- A. Contractor to notify Port of any discrepancy. The Contractor's obligations to review and carefully study the Contract Documents and field conditions are for the purpose of facilitating coordination and construction. If the Contractor at any time observes that the Contract Documents, including Drawings and Specifications, vary from the conditions of the Project site, are in error, or omit any necessary detail, the Contractor shall promptly notify the Engineer in writing through a Request for Information. Any Work done after such observation, until authorized by the Engineer, shall be at Contractor's risk. The Contractor shall also promptly report to the Engineer any observed error, inconsistency, omission, or variance with applicable laws through a Request for Information. If the Contractor fails either to carefully study and compare the Contract Documents, or to promptly report any observed error, inconsistency, omission, or variance, the Contractor shall assume full responsibility and shall bear all costs, liabilities, and damages attributable to the error, inconsistency, omission, or variance.
- B. Requests for Information. The Contractor shall submit Requests for Information concerning the Contract Documents by following the procedure and using such form as the Port may require. The Contractor shall minimize Requests for Information by thoroughly studying the Contract Documents and reviewing all Subcontractor requests. The Contractor shall allow adequate time in its planning and scheduling for a response from the Port to a Request for Information.
- C. Port may provide information to supplement Drawings and Specifications. Minor items of work or detail that are omitted from the Drawings and Specifications, but inferable from the information presented and normally provided by accepted good practice, shall be provided and/or performed by the Contractor as part of the Contract Sum and within the Contract Time. Similarly, the Engineer may furnish to the Contractor additional Drawings and clarifications, consistent with the Contract Documents, as necessary to detail and illustrate the Work. The Contractor shall conform its Work to such additional Drawings and clarifications at no increase in the Contract Sum or Contract Time.

3.03 SUPERVISION AND RESPONSIBILITY FOR SUBCONTRACTORS

- A. Contractor responsible for Work and workers. The Contractor shall have complete control of the means, methods, techniques, sequences, or procedures related to the Work, and for all safety precautions or programs. The Contractor shall have complete control over, and responsibility for, all personnel performing the Work. The Contractor is also responsible for the acts and omissions of the Contractor's principals, employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors of any tier.
- B. Contractor to supervise the Work. The Contractor shall continuously supervise and direct the Work using competent and skilled personnel and the Contractor's best skill and attention.
- C. Contractor to enforce discipline and good order. The Contractor shall enforce strict discipline and good order among all workers on the Project, and shall not employ any unfit person or anyone not skilled in the work to which they are assigned. Incompetent, careless, or negligent workers shall immediately be removed from the Work. The Port may, but is not obligated to, require the Contractor to remove from the Work, at no change in the Contract Sum or Contract Time, anyone whom the Port considers objectionable.

3.04 MATERIALS AND EQUIPMENT

- A. Material and equipment to be new. All materials and equipment to be incorporated into the Work shall be new, unless specifically provided otherwise in the Contract Documents. The Contractor shall, if required in writing by the Port, furnish satisfactory evidence regarding the kind and quality of any materials, identify the source, and warrant compliance with the Contract Documents. The Contractor shall ensure that all materials and equipment are protected, kept dry, and stored under cover in a manner to protect such materials and equipment.
- B. Material and equipment shall conform to manufacturer instructions. All materials and equipment shall conform, and shall be applied, installed, used, maintained, and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, or processor, unless otherwise specifically provided by the Engineer.

3.05 CONTRACTOR WARRANTIES

- A. Work will be of good quality and performed in workmanlike manner. In addition to any specific warranties set forth in the Contract Documents, the Contractor warrants that the Work, including all materials and equipment furnished under the Contract, will be of good quality and new, will be performed in a skillful and workmanlike manner, and will conform to the requirements of the Contract Documents. Any Work not conforming to this warranty, including unapproved or unauthorized substitutions, shall be considered defective.
- B. Work will be free from defects. The Contractor warrants that the Work will be free from defects for a period of one (1) year from the date of Substantial Completion of the Project.
- C. Contractor to collect and deliver warranties to Port. The Contractor shall collect and deliver to the Port any written warranties required by the Contract Documents. These warranties shall be obtained and enforced by the Contractor for the benefit of the Port without the necessity of separate assignment. These warranties shall extend to the Port all rights, claims, benefits, and interests that the Contractor may have under express or implied warranties or guarantees against a Subcontractor of any tier, supplier, or manufacturer for defective or non-conforming Work. Warranty provisions that purport to limit or alter the Port's rights under the Contract Documents, or the laws of the State of Washington, are null and void.
- D. General requirements. The Contractor is not relieved of its general warranty obligations by the specification of a particular product or procedure in the Contract Documents. Warranties in the Contract Documents shall survive completion, acceptance, and final payment.

3.06 REQUIRED WAGES

- A. Contractor will pay required wages. The Contractor shall pay (and shall ensure that all Subcontractors of any tier pay) all prevailing wages and other wages (such as Davis-Bacon Act wages) applicable to the Project. See Specification Section 00 73 46.
- B. The Contractor shall defend (at Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold the Port harmless from all liabilities, obligations, claims, demands, damages, disbursements, lawsuits, losses, fines, penalties, costs, and expenses, whether direct or indirect, and including, but not limited to, attorneys' fees and consultants' fees and other costs and expenses of litigation, from any violation or alleged violation by the Contractor or any Subcontractor of any tier of RCW 39.12 ("Prevailing Wages on Public Works") or Chapter 51 RCW ("Industrial Insurance").

3.07 STATE AND LOCAL TAXES

- A. Contractor will pay taxes on consumables. The Contractor will pay the retail sales tax on all consumables used during performance of the Work and on all items that are not incorporated into the final Work; this tax shall be included in the Contract Sum.

- B. Port will pay taxes on the Contract Sum. The Port will pay state and local retail sales tax on the Contract Sum with each progress payment, and on final payment, for transmittal by the Contractor to the Washington State Department of Revenue or to the applicable local taxing authority. Rule 170: WAC 458-20-170.
- C. Direct all tax questions to the Department of Revenue. The Contractor should direct all questions concerning taxes on any portion of the Work to the State of Washington Department of Revenue or to the local taxing authority.
- D. State Sales Tax - Rule 171: WAC 458-20-171. For work performed related to building, repairing, or improving streets, roads, etc., which are owned by a municipal corporation, or political subdivision of the state, or by the United States, and which are used, primarily, for foot or vehicular traffic, the Contractor shall include Washington State Retail Sales Taxes in the various schedule prices, or other contract amounts, including those that the Contractor pays on the purchase of materials, equipment, or supplies used or consumed in doing the Work.
 - 1. The bid form will indicate which bid items are subject to Rule 171. Any such identification by the Port is not binding upon the Department of Revenue.

3.08 PERMITS, LICENSES, FEES, AND ROYALTIES

- A. Contractor to provide and pay for permits unless otherwise specified. Unless otherwise specified, the Contractor shall procure and pay for all permits, licenses, and governmental inspection fees necessary or incidental to the performance of the Work. All costs related to these permits, licenses, and inspections shall be included in the Contract Sum. Any action taken by the Port to assist the Contractor in obtaining permits or licenses shall not relieve the Contractor of its sole responsibility to obtain and pay for permits, licenses, and inspections as part of the Contract Sum.
- B. Contractor's obligations when permit must be in Port's name. When applicable law or agency requires a permit to be issued to a public agency, the Port will support the Contractor's request for the permit and accept the permit in the Port's name, if:
 - 1. The Contractor takes all necessary steps required for the permit to be issued;
 - 2. The permit applies to Work performed in connection with the Project; and
 - 3. The Contractor agrees in writing to abide by all requirements of the permit and to defend and hold harmless the Port from any liability in connection with the permit.
- C. Contractor to pay royalties. The Contractor shall pay all royalties and license fees required for the Work unless otherwise specified in the Contract Documents.

3.09 SAFETY

- A. Contractor solely responsible for safety. The Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work and the performance of the Contract.
- B. Port not responsible for safety. The Port may identify safety concerns to the Contractor; however, no action or inaction of the Port or any third party relating to safety will: (1) relieve the Contractor of its sole and complete responsibility for safety and sole liability for any consequences, (2) impose any obligation on the Port or a third party to inspect or review the Contractor's safety program or precautions, (3) impose any continuing obligation on the Port or a third party to ensure the Contractor performs the Work safely, or (4) affect the Contractor's responsibility for the protection of property, workers, and the general public.

- C. Contractor to maintain a safe Work site. The Project site may be occupied during performance of the Work. The safety of these site occupants is of paramount importance to the Port. The Contractor shall maintain the Work site and perform the Work in a safe manner and in accordance with the Washington Industrial Safety and Health Act (WISHA) and all other applicable safety laws, rules, and regulations. This requirement shall apply continuously and not be limited to working hours.
- D. Contractor to protect Work site and adjacent property until Final Completion. The Contractor shall continuously protect the Work and adjacent property from damage. At all times until Final Completion, the Contractor shall be responsible for, and protect from damage, weather, deterioration, theft, and vandalism, the Work and all materials, equipment, tools, and other items incorporated or to be incorporated in the Work, and shall repair any damage, injury, or loss.

3.10 CORRECTION OF WORK

- A. Contractor to correct defective Work. The Contractor shall, at no cost to the Port, promptly correct Work that is defective or that otherwise fails to conform to the requirements of the Contract Documents. Such Work shall be corrected, whether before or after Substantial Completion, and even if it was previously inspected or observed by the Port.
- B. One-year correction period. The Contractor shall correct all defects in the Work appearing within one (1) year of Substantial Completion or within any longer period prescribed by law or by the Contract Documents. The Contractor shall initiate remedial action within fourteen (14) days of receipt of notice from the Port and shall complete remedial work within a reasonable time. Work corrected by the Contractor shall be subject to the provisions of this Section 3.10 for an additional one-year period following the Port's acceptance of the corrected Work.
- C. Contractor responsible for defects and failures to correct. The Contractor shall be responsible for any expenses incurred by the Port resulting from defects in the Work. If the Contractor refuses or neglects to correct the defects, or does not timely accomplish corrections, the Port may correct the Work and charge the Contractor the cost of the corrections. If damage or loss of service may result from a delay in correction, the corrections may be made by the Port and reimbursed by the Contractor.
- D. Port may accept defective work. The Port may, at its sole option, elect to retain defective or nonconforming Work. In such a case, the Port shall reduce the Contract Sum by a reasonable amount to account for the defect or non-conformance.
- E. No period of limitation established. Nothing contained in this Section 3.10 establishes a period of limitation with respect to any obligations under the Contract Documents or law. The establishment of the one (1) year correction period relates only to the specific obligation of the Contractor to correct defective or non-conforming Work.

3.11 UNCOVERING OF WORK

- A. Contractor to uncover work covered prior to inspection. If any portion of the Work is covered prior to inspection and approval, the Contractor shall, at its expense, uncover or remove the Work for inspection by the Port or others, and replace the Work to the standard required by the Contract Documents.

- B. Contractor to uncover work at Port's request. After initial inspection and observation, the Port may order a reexamination of Work, and the Work must be uncovered by the Contractor. If the uncovered Work complies with the Contract Documents, the Port shall pay the cost of reexamination and replacement. If the Work is found not to comply with the Contract Documents, the Contractor shall pay the cost of replacement, unless the Contractor demonstrates that it did not cause the defect in the Work.

3.12 RELOCATION OF UTILITIES

- A. Contractor should assume underground utilities are in approximate locations. The Contractor should assume that the locations of any underground or hidden utilities, underground tanks, and plumbing or electrical runs indicated in surveys or the Contract Documents are shown in approximate locations. The accuracy of this information is not guaranteed by the Port and shall be verified by the Contractor. The Contractor shall comply with RCW 19.122.030 and utilize a utility locator service to locate utilities on Port property. The Contractor shall bear the risk of loss if any of its Work directly or indirectly damages or interrupts any utility service or causes or contributes to damages of any nature.
- B. Utility relocation or removal. Where relocation or removal of utilities is necessary or required, it shall be performed at the Contractor's sole expense, unless the Contract Documents specify otherwise. If a utility owner is identified as being responsible for relocating or removing utilities, the work will be accomplished at the utility owner's convenience, either during, or in advance of, construction. Unless otherwise specified, it shall be the Contractor's sole responsibility to coordinate, schedule, and pay for work performed by a utility owner.
- C. Contractor to notify Port of unknown utilities. If the Contractor discovers the presence of any unknown utilities, it shall immediately notify the Engineer in writing.

3.13 LABOR

- A. Contractor responsible for labor peace. The Contractor is responsible for labor peace relating to the Work and shall cooperate in maintaining Project-wide labor harmony. The Contractor shall use its best efforts as an experienced contractor to adopt and implement policies and practices designed to avoid work stoppages, slowdowns, disputes, or strikes.
- B. Contractor to minimize impact of labor disputes. The Contractor will take all necessary steps to prevent labor disputes from disrupting or otherwise interfering with access to Port property. If a labor dispute disrupts the progress of the Work or interferes with access, the Contractor shall promptly and expeditiously take all necessary action to eliminate or minimize the disruption or interference.

3.14 INDEMNIFICATION

- A. Duty to defend, indemnify, and hold harmless. To the fullest extent permitted by law and subject to this Section 3.14, the Contractor shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold harmless the Port and the Northwest Seaport Alliance, including their respective Commissions, officers, managers, and employees, the Engineer, any consultants, and the agents and employees, successors and assigns of any of them (the "Indemnified Parties") from and against claims, damages, lawsuits, losses (including loss of use), disbursements, liabilities, obligations, fines, penalties, costs, and expenses, whether direct and indirect or consequential, including but not limited to, consultants' fees, and attorneys' fees incurred on such claims and in proving the right to indemnification ("Claims"), arising out of, or resulting from, the acts or omissions of the Contractor, a Subcontractor of any tier, their agents, and anyone directly or indirectly employed by any of them or anyone for whose acts they may be liable (individually and collectively, the "Indemnitor").

- B. Duty to defend, indemnify, and hold harmless for sole negligence. The Contractor will fully defend, indemnify, and hold harmless the Indemnified Parties for the sole negligence or willful misconduct of the Indemnitor.
- C. Duty to defend, indemnify, and hold harmless for concurrent negligence. Where Claims arise from the concurrent negligence of (1) the Port; and (2) the Indemnitor, the Contractor's obligations to indemnify and defend the Indemnified Parties under this Section 3.14 shall be effective only to the extent of the Indemnitor's negligence.
- D. Duty to indemnify not limited by workers' compensation or similar employee benefit acts. In claims against any of the Indemnified Parties by an employee of the Contractor, a Subcontractor of any tier, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under this Section 3.14 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable under workers' compensation acts, disability benefit acts, or other employee benefit acts. After mutual negotiation of the parties, the Contractor waives immunity as to the Indemnified Parties under Title 51 RCW, "Industrial Insurance."
- E. Intellectual property indemnification. The Contractor will be liable for and shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold the Indemnified Parties harmless for Claims for infringement by the Contractor of copyrights or patent rights arising out of, or relating to, the Project.
- F. Labor peace indemnification. If the Contractor fails to satisfy its labor peace obligations under the Contract, the Contractor will be liable for and shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold harmless the Indemnified Parties for Claims brought against the Port by third parties (including but not limited to lessees, tenants, contractors, customers, licensees, and invitees of the Port) for injunctive relief or monetary loss.
- G. Cyber risk indemnification. Contractor shall defend, indemnify, and hold harmless the Indemnified Parties from and against any liability, expense, fines, penalties, cost, demand, or other obligation, resulting from or out of any cyber-related risk that includes theft, loss or misuse of data, release of private information as result of a network breach, penetration, compromise, or loss of IT systems control.
- H. Joinder. The Contractor agrees to being added by the Port as a party to any arbitration or litigation with third parties in which the Port alleges indemnification or seeks contribution from the Indemnitor. The Contractor shall cause each of its Subcontractors of any tier to similarly stipulate in their subcontracts; in the event any does not, the Contractor shall be liable in place of such Subcontractor(s) of any tier.
- I. Other. To the extent that any portion of this Section 3.14 is stricken by a court or arbitrator for any reason, all remaining provisions shall retain their vitality and effect. The obligations of the Contractor under this Section 3.14 shall not be construed to negate, abridge, or otherwise reduce any other right or obligations of indemnity which would otherwise exist. To the extent the wording of this Section 3.14 would reduce or eliminate an available insurance coverage, it shall be considered modified to the extent necessary so that the insurance coverage is not affected. This Section 3.14 shall survive completion, acceptance, final payment, and termination of the Contract.

3.15 WAIVER OF CONSEQUENTIAL DAMAGES

- A. Mutual waiver of consequential damages. The Contractor and Port waive claims against each other for consequential damages arising out of, or relating to, this Contract. This mutual waiver includes, but is not limited to: (1) damages incurred by the Port for rental expenses, 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 and home office overhead and expenses including, but not limited to, the compensation of personnel stationed there, for losses of financing, business, and reputation, for losses on other projects, for loss of profit, and for interest or financing costs. This mutual waiver includes, but is not limited to, all consequential damages due to either party's termination.
- B. Limitation. Nothing contained in this Section 3.15; however, shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents, to preclude damages specified in the Agreement, or to affect the Contractor's obligation to indemnify the Port for direct, indirect, or consequential damages alleged by a third party.

ARTICLE 4 - SUBCONTRACTORS AND SUPPLIERS

4.01 RESPONSIBILITY FOR ACTIONS OF SUBCONTRACTORS AND SUPPLIERS.

- A. Contractor responsible for Subcontractors. The Contractor is fully responsible to the Port for the acts and omissions of its Subcontractors of any tier and all persons either directly or indirectly employed by the Contractor or its Subcontractors.

4.02 AWARD OF CONTRACTS TO SUBCONTRACTORS AND SUPPLIERS

- A. Contractor to provide proposed Subcontractor information. The Contractor, within ten (10) days after the Port's notice of award of the Contract, shall provide the Engineer with the names of the persons or entities proposed to perform each of the principal portions of the Work (i.e., either a Subcontractor listed in a bid or proposal or a Subcontractor performing Work valued at least ten percent (10%) of the Contract Sum) and the proprietary names, and the suppliers of, the principal items or systems of materials and equipment proposed for the Work. No progress payment will become due until after this information has been furnished.
- B. Port to respond promptly with objections. The Port may respond promptly to the Contractor in writing stating: (1) whether the Port has reasonable objection to any proposed person or entity, or (2) whether the Port requires additional time for review. If the Port makes a reasonable objection, the Contractor shall replace the Subcontractor with no increase to the Contract Sum or Contract Time. Such a replacement shall not relieve the Contractor of its responsibility for the performance of the Work and compliance with all of the requirements of the Contract within the Contract Sum and Contract Time.
- C. Reasonable objection defined. "Reasonable objection" as used in this Section 4.02 includes, but is not limited to: (1) a proposed Subcontractor of any tier different from the entity listed with the bid, (2) lack of "responsibility" of the proposed Subcontractor, as defined by Washington law and the Bidding Documents, or lack of qualification or responsibility of the proposed Subcontractor based on the Contract or Bidding Documents, or (3) failure of the Subcontractor to perform satisfactorily in the Port's opinion (such as causing a material delay or submitting a claim that the Port considers inappropriate) on one or more projects for the Port within five (5) years of the bid date.
- D. No substitution allowed without permission. The Contractor shall not substitute a Subcontractor, person, or organization without the Engineer's written consent.

4.03 SUBCONTRACTOR AND SUPPLIER RELATIONS

- A. Contractor to schedule, supervise, and coordinate Subcontractors. The Contractor shall schedule, supervise, and coordinate the operations of all Subcontractors of any tier, including suppliers. The Contractor shall ensure that appropriate Subcontractors coordinate the Work of lower-tier Subcontractors.
- B. Subcontractors to be bound to Contract Documents. By appropriate agreement, the Contractor shall require each Subcontractor and supplier to be bound to the terms of the Contract Documents and to assume toward the Contractor, to the extent of their Work, all of the obligations that the Contractor assumes toward the Port under the Contract Documents. Each subcontract shall preserve and protect the rights of the Port and shall allow to the Subcontractor, unless specifically provided in the subcontract, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Port. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with lower-tier Subcontractors.
- C. Contractor to correct deficiencies in Subcontractor performance. When a portion of the Work subcontracted by the Contractor is not being prosecuted in accordance with the Contract Documents, or if such subcontracted Work is otherwise being performed in an unsatisfactory manner in the Port's opinion, the Contractor shall, on its own initiative or upon the written request of the Port, take immediate steps to correct the deficiency or remove the non-performing party from the Project. The Contractor shall replace inadequately performing Subcontractors upon request of the Port at no change in the Contract Sum or Contract Time.
- D. Contractor to provide subcontracts. Upon request, the Contractor will provide the Port copies of written agreements between the Contractor and any Subcontractor.

ARTICLE 5 - WORKFORCE AND NON-DISCRIMINATION REQUIREMENTS

5.01 COMPLIANCE WITH NON-DISCRIMINATION LAWS

- A. Contractor to comply with non-discrimination laws. The Contractor shall fully comply with all applicable laws, regulations, and ordinances pertaining to non-discrimination.
- B. Nondiscrimination Provision
 - 1. Nondiscrimination Requirement. During the term of this Contract, Contractor, including any subcontractor, shall not discriminate on the bases enumerated at RCW 49.60.530(3). In addition, Contractor, including any subcontractor, shall give written notice of this nondiscrimination requirement to any labor organizations with which Contractor, or subcontractor, has a collective bargaining or other agreement.
 - 2. Obligation to Cooperate. Contractor, including any subcontractor, shall cooperate and comply with any Washington state agency investigation regarding any allegation that Contractor, including any subcontractor, has engaged in discrimination prohibited by this Contract pursuant to RCW 49.60.530(3).

3. Default. Notwithstanding any provision to the contrary, POT may suspend Contractor, including any subcontractor, upon notice of a failure to participate and cooperate with any state agency investigation into alleged discrimination prohibited by this Contract, pursuant to RCW 49.60.530(3). Any such suspension will remain in place until POT receives notification that Contractor, including any subcontractor, is cooperating with the investigating state agency. In the event Contractor, or subcontractor, is determined to have engaged in discrimination identified at RCW 49.60.530(3), POT may terminate this Contract in whole or in part, and Contractor, subcontractor, or both, may be referred for debarment as provided in RCW 39.26.200. Contractor or subcontractor may be given a reasonable time in which to cure this noncompliance, including implementing conditions consistent with any court-ordered injunctive relief or settlement agreement.
4. Remedies for Breach. Notwithstanding any provision to the contrary, in the event of Contract termination or suspension for engaging in discrimination, Contractor, subcontractor, or both, shall be liable for contract damages as authorized by law including, but not limited to, any cost difference between the original contract and the replacement or cover contract and all administrative costs directly related to the replacement contract, which damages are distinct from any penalties imposed under Chapter 49.60, RCW. POT shall have the right to deduct from any monies due to Contractor or subcontractor, or that thereafter become due, an amount for damages Contractor or subcontractor will owe POT for default under this provision.

5.02 MWBE, VETERAN-OWNED, AND SMALL BUSINESS ENTERPRISE PARTICIPATION.

- A. In accordance with the legislative findings and policies set forth in RCW 39.19, the Port encourages participation in all of its contracts by MWBE firms certified by the Office of Minority and Women's Business Enterprises (OMWBE). Participation may be either on a direct basis in response to this invitation or as a subcontractor to a Bidder. However, unless required by federal statutes, regulations, grants, or contract terms referenced in the Contract Documents, no preference will be included in the evaluation of Bids, no minimum level of MWBE participation shall be required as a condition for receiving an award, and Bids will not be rejected or considered non-responsive on that basis. Any affirmative action requirements set forth in federal regulations or statutes included or referenced in the Contract Documents will apply.

The Port encourages participation in all of its contracts by Veteran-owned businesses (defined in RCW 43.60.010) and located at <http://www.dva.wa.gov/program/certified-veteran--and-servicemember-owned-businesses> and Small, Mini, and Micro businesses (defined in RCW 39.26.010)

5.03 APPRENTICESHIP PARTICIPATION

- A. In accordance with RCW 39.04.320, fifteen (15) percent Apprenticeship Participation is required for all projects estimated to cost one million (\$1,000,000) dollars or more.
- B. Apprentice participation, under this contract, may be counted towards the required percentage (%) only if the apprentices are from an apprenticeship program registered and approved by the Washington State Apprenticeship and Training Council (RCW 49.04 and WAC 296-05).
- C. Bidders may contact the Department of Labor and Industries, Specialty Compliance Services Division, Apprenticeship Section, P.O. Box 44530, Olympia, WA 98504-4530 by phone at (360) 902-5320, or e-mail at Apprentice@lni.wa.gov, to obtain information on available apprenticeship programs.

- D. For each project that has apprentice requirements, the contractor shall submit a "Statement of Apprentice and Journeyman Participation" on forms provided by the Port of Tacoma, with every request for project payment. The Contractor shall submit consolidated and cumulative data collected by the Contractor and collected from all subcontractors by the Contractor. The data to be collected and submitted includes the following:
1. Contractor name and address
 2. Contract number
 3. Project name
 4. Contract value
 5. Reporting period "Beginning Date" through "End Date"
 6. Name and registration number of each apprentice by contractor
 7. Total number of apprentices and labor hours worked by them, categorized by trade or craft.
 8. Total number of journeymen and labor hours worked by them, categorized by trade or craft
 9. Cumulative combined total of apprentice and journeymen labor hours
 10. Total percentage of apprentice hours worked
- E. No changes to the required percentage (%) of apprentice participation shall be allowed without written approval of the Port. In any request for the change, the Contractor shall clearly demonstrate a good faith effort to comply with the requirements for apprentice participation.
- F. Labor hours used in the 15% labor hour calculation will include all employees working on the project who are subject to prevailing wage laws. The definition of Labor Hours is further clarified to include working supervisor and foreman hours if they are covered under prevailing wage laws based on the time spent performing laborious activities. Simply adding supervisor or foreman to the employee's title does not exempt their hours from the calculation.
- G. During the life of the project, Apprentice Utilization is actively monitored through LNIs Prevailing Wage Intents and Affidavits (PWIA) system using the certified payroll calculated percentage. In addition, the affidavit calculated percentage shown in PWIA must be at least 15.0% to be compliant. All affidavits must be filed before determining if the Apprentice Utilization Requirement was met. Failure to achieve at least 15.0% apprentice Utilization as shown in PWIA for certified payrolls and affidavits will cause a penalty of \$500.00

ARTICLE 6 - CONTRACT TIME AND COMPLETION

6.01 CONTRACT TIME

- A. Contract Time is measured from Contract execution. Unless otherwise provided in the Agreement, the Contract Time is the period of time, including authorized adjustments, specified in the Contract Documents from the date the Contract is executed to the date Substantial Completion of the Work is achieved.

- B. Commencement of the Work. The Contractor shall begin Work in accordance with the notice of award and the notice to proceed and shall complete all Work within the Contract Time. When the Contractor's signed Agreement, required insurance certificate with endorsements, bonds, and other submittals required by the notice of award have been accepted by the Port, the Port will execute the Contract and, following receipt of other required pre-work submittals, will issue a notice to proceed to allow the Contractor to mobilize and commence physical Work at the Project site, as further described in these contract documents. No Work at the Project site may commence until the Port issues a notice to proceed.
- C. Contractor shall achieve specified completion dates. The Contractor shall achieve Substantial Completion within the Contract Time and shall achieve Final Completion within the time period thereafter stated in the Contract Documents.
- D. Time is of the essence. Time limits stated in the Contract Documents, including any interim milestones, 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.

6.02 PROGRESS AND COMPLETION

- A. Contractor to maintain schedule. The Contractor's sequence and method of operations, application of effort, and work force shall at all times be created and implemented to ensure the orderly, expeditious, and timely completion of the Work and performance of the Contract. The Contractor shall furnish sufficient forces and shall work such hours, including extra shifts, overtime operations, and weekend and holiday work as may be necessary to ensure completion of the Work within the Contract Time and the approved Baseline Project Schedule.
- B. Contractor to take necessary steps to meet schedule. If the Contractor fails substantially to perform in a timely manner in accordance with the Contract Documents and, through the fault of the Contractor or Subcontractor(s) of any tier, fails to meet the Baseline Project Schedule, the Contractor shall take such steps as may be necessary to immediately improve its progress by increasing the number of workers, shifts, overtime operations, or days of work, or by other means and methods, all without additional cost to the Port. If the Contractor believes that any action or inaction of the Port constitutes acceleration, the Contractor shall immediately notify the Port in writing and shall not accelerate the Work until the Port either directs the acceleration in writing or denies the constructive acceleration.
- C. Liquidated damages not exclusive. Any provisions in the Contract Documents for liquidated damages shall not preclude other damages due to breaches of Contract of the Contractor.

6.03 SUBSTANTIAL COMPLETION

- A. Substantial Completion defined. Substantial Completion is the stage in the progress of the Work, or portion or phase thereof, when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Port can fully occupy or utilize the Work, or the designated portion thereof, for its intended use, all requirements in the Contract Documents for Substantial Completion have been achieved, and all required documentation has been properly submitted to the Port in accordance with the Contract Documents. All Work, other than incidental corrective or punch list Work and final cleaning, must be completed. The fact that the Port may occupy the Work or a designated portion thereof does not indicate that Substantial Completion has occurred or that the Work is acceptable in whole or in part.
- B. Work not Substantially Complete unless Final Completion attainable. The Work is not Substantially Complete unless the Port reasonably judges that the Work can achieve Final Completion within the period of time specified in the Contract Documents.

- C. Notice of Substantial Completion. When the Work or designated portion has achieved Substantial Completion, the Port will provide a notice to establish the date of Substantial Completion. The notice shall establish responsibilities of the Port and Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the Contractor shall finish all remaining Work. If the notice of Substantial Completion does not so state, all responsibility for the foregoing items shall remain with the Contractor until Final Completion.

6.04 COMPLETION OF PUNCH LIST

- A. Contractor shall complete punch list items prior to Final Completion. The Contractor shall cause punch list items to be completed prior to Final Completion. If, after Substantial Completion, the Contractor does not expeditiously proceed to correct punch list items or if the Port considers that the punch list items, are unlikely to be completed prior to the date established for Final Completion (or such other period of time as is specified in the Contract Documents), the Port may, upon seven (7) days' written notice to the Contractor, take over and perform some or all of the punch list items. The Port may also take over and complete any portion of the Work at any time following Substantial Completion and deduct the actual cost of performing the Work (including direct and indirect costs) from the Contract Sum. The Port's rights under this Section 6.04 are not obligations and shall not relieve the Contractor of its responsibilities under any other provisions of the Contract Documents.

6.05 FINAL COMPLETION

- A. Final Completion. Upon receipt of written notice from the Contractor that all punch list items and other Contract requirements are completed, the Contractor will notify the Port, and the Port will perform a final inspection. If the Port determines that some or all of the punch list items have not been addressed, the Contractor shall be responsible to the Port for all costs, including re-inspection fees, for any subsequent reviews to determine completion of the punch list. When the Port determines that all punch list items have been satisfactorily addressed, that the Work is acceptable under the Contract Documents, and that the Work has fully been performed, the Port will promptly notify the Contractor of Final Completion.
- B. Contractor responsible for costs if Final Completion is not timely achieved. In addition to any liquidated damages, the Contractor is liable for, and the Port may deduct from any amounts due the Contractor, all costs incurred by the Port for services performed after the contractual date of Final Completion, whether or not those services would have been performed prior to that date had Final Completion been timely achieved.
- C. Final Completion submittals. The Port is not obligated to accept the Project as complete until the Contractor has submitted all required submittals to the Port.
- D. Contractor responsible for the Work until Final Completion. The Contractor shall assume the sole risk of loss and responsibility for all Work under the Contract, and all materials to be incorporated in the Work, whether in storage or at the Project site, until Final Completion. Damage from any cause to either permanent or temporary Work, utilities, materials, equipment, existing structures, the site, or other property owned by the Port or others, shall be repaired by the Contractor to the reasonable satisfaction of the Port at no change in the Contract Sum.

6.06 FINAL ACCEPTANCE

- A. Final Acceptance. Final Acceptance is the formal action of the Port accepting the Project as complete. Public notification of Final Acceptance will be posted on the Port's external website (<http://www.portoftacoma.com/final-acceptance>).

- B. Final Acceptance not an acceptance of defective Work. Final Acceptance shall not constitute acceptance by the Port of unauthorized or defective Work, and the Port shall not be prevented from requiring the Contractor to remove, replace, repair, or dispose of unauthorized or defective Work or recovering damages due to the same.
- C. Completion of Work under RCW 60.28. Pursuant to RCW 60.28, "Lien for Labor, Materials, Taxes on Public Works," completion of the Contract Work shall occur upon Final Acceptance.

6.07 PORT'S RIGHT TO USE THE PREMISES

- A. Port has right to use and occupy Work. The Port reserves the right to occupy or use any part of the Work before or after Substantial Completion of some or all of the Work without relieving the Contractor of any of its obligations under the Contract. Such occupancy or use shall not constitute acceptance by the Port of any of the Work, and shall not cause any insurance to be canceled or lapse.
- B. No compensation due if Port elects to use and occupy Work. No additional compensation shall be due to the Contractor as a result of the Port's use or occupancy of the Work or a designated portion.

ARTICLE 7 - PAYMENT

7.01 ALL PAYMENTS SUBJECT TO APPLICABLE LAWS AND SCHEDULE OF VALUES

- A. Payment of the Contract Sum. The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Port to the Contractor for performance of the Work under the Contract Documents. Payments made to the Contractor are subject to all laws applicable to the Port and the Contractor. Payment of the Contract Sum constitutes full compensation to the Contractor for performance of the Work, including all risk, loss, damages, or expense of whatever character arising out of the nature or prosecution of the Work. The Port is not obligated to pay for extra work or materials furnished without prior written approval of the Port.
- B. Schedule of Values. All payments will be based upon an approved Schedule of Values. Prior to submitting its first Application for Payment, the Contractor shall submit a Schedule of Values to the Port allocating the entire Contract Sum to the various portions of the Work. The Schedule of Values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Port may require. This schedule, unless objected to by the Port, shall be used as a basis for reviewing the Contractor's applications for payment.

7.02 APPLICATIONS FOR PAYMENT

- A. Applications for Payment. Progress payments will be made monthly for Work duly certified, approved by the Engineer, and performed (based on the Schedule of Values and actual quantities of Work performed) during the calendar month preceding the Application for Payment. These amounts are paid in trust to the Contractor for distribution to Subcontractors to the extent, and in accordance with, the approved Application for Payment.

7.03 PROGRESS PAYMENTS

- A. Progress payments. Following receipt of a complete Application for Payment, the Engineer will either authorize payment or indicate in writing to the Contractor the specific reasons why the payment request is being denied, in whole or in part, and the remedial action the Contractor must take to receive the withheld amount. After a complete Application for Payment has been received and approved by the Port, payment will be made within thirty (30) days. Any payments made by, or through, or following receipt of, payment from third parties will be made in accordance with the third party's policies and procedures.
- B. Port may withhold payment. The Port may withhold payment in whole or in part as provided in the Contract Documents or to the extent reasonably necessary to protect the Port from loss or potential loss for which the Contractor is responsible, including loss resulting from the Contractor's acts and omissions.

7.04 PAYMENT BY CONTRACTOR TO SUBCONTRACTORS

- A. Payment to Subcontractors. With each Application for Payment, the Contractor shall provide a list of Subcontractors to be paid by the Contractor. No payment request shall include amounts the Contractor does not intend to pay to a Subcontractor because of a dispute or other reason. If, however, after submitting an Application for Payment, but before paying a Subcontractor, the Contractor discovers that part or all of a payment otherwise due to the Subcontractor is subject to withholding from the Subcontractor under the subcontract (such as for unsatisfactory performance or non-payment of lower-tier Subcontractors), the Contractor may withhold the amount as allowed under the subcontract, but it shall give the Subcontractor and the Port written notice of the remedial actions that must be taken and pay the Subcontractor within eight (8) working days after the Subcontractor satisfactorily completes the remedial action identified in the notice.
- B. Payment certification to be provided upon request. The Contractor shall provide, with each Application for Payment, a certification signed by Contractor attesting that all payments by the Contractor to Subcontractors from the last Application for Payment were made within ten (10) days of the Contractor's receipt of payment. The certification will also attest that the Contractor will make payment to Subcontractors for the current Application for Payment within ten (10) days of receipt of payment from the Port.

7.05 FINAL PAYMENT

- A. Final payment. Final applications for payment are due within seven (7) days following Final Completion. Final payment of the unpaid balance of the Contract Sum, except retainage, will be made following Final Completion and within thirty (30) days of the Contractor's submission of an approved final Application for Payment.
- B. Releases required for final payment. The final payment shall not become due until the Contractor delivers to the Port a complete release of all liens arising out of the Contract, as well as an affidavit stating that, to the best of Contractor's knowledge, its release includes all labor and materials for which a lien could be filed. If a Subcontractor of any tier refuses to furnish a release or waiver required by the Port, the Port may (a) retain in the fund, account, or escrow funds in such amount as to defray the cost of foreclosing the liens of such claims and to pay attorneys' fees, the total of which shall be no less than 150% of the claimed amount, or (b) accept a bond from the Contractor, satisfactory to the Port, to indemnify the Port against the lien. If any such lien remains unsatisfied after all payments from the retainage are made, the Contractor shall refund to the Port all moneys that the Port may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

- C. Contractor to hold Port harmless from liens. The Contractor shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold harmless the Port from any liens, claims, demands, lawsuits, losses, damages, disbursements, liabilities, obligations, fines, penalties, costs, and expenses, whether direct or indirect, including but not limited to, attorneys' fees and consultants' fees and other costs and expenses, except to the extent a lien has been filed because of the failure of the Port to make a contractually required payment.

7.06 RETAINAGE

- A. Retainage to be withheld. In accordance with RCW 60.28, a sum equal to five percent (5%) of each approved Application for Payment shall be retained. Prior to submitting its first Application for Payment, the Contractor shall exercise one of the options listed below:
 - 1. Retained percentages will be retained by the Port in a fund; or
 - 2. Deposited by the Port in an interest-bearing account or escrow account in a bank, mutual savings bank, or savings and loan association designated by the Contractor, not subject to withdrawal until after the final acceptance of said improvement or work as completed, or until agreed to by both parties; provided that interest on such account shall be paid to the Contractor. Contractor to complete and submit Port provided Retainage Escrow Agreement (Section 00 61 23.13); or
 - 3. If the Contractor provides a bond in place of retainage, it shall be in an amount equal to 5% of the Contract Sum plus Change Orders. The retainage bond shall be based on the form furnished in Section 00 61 23 or otherwise acceptable to the Port and duly completed and signed by a licensed surety or sureties registered with the Washington State Insurance Commissioner and on the currently authorized insurance list published by the Washington State Insurance Commissioner. The surety or sureties must be rated at least "A-, FSC(6)" or higher by A.M. Best Rating Guide and be authorized by the Federal Department of the Treasury. Attorneys-in-fact who sign the retainage bond must file with each bond a certified and effective Power of Attorney statement.
- B. Contractor may withhold retainage from Subcontractors. The Contractor or a Subcontractor may withhold not more than five percent (5%) retainage from the monies earned by any Subcontractor or lower-tier Subcontractor, provided that the Contractor pays interest to the Subcontractor at the same interest rate it receives from its reserved funds. If requested by the Port, the Contractor shall specify the amount of retainage and interest due a Subcontractor.
- C. Release of retainage. Retainage will be withheld and applied by the Port in a manner required by RCW 60.28 and released in accordance with the Contract Documents and statutory requirements. Release of the retainage will be processed in the ordinary course of business within sixty (60) days following Final Acceptance of the Work by the Port provided that no notice of lien has been given as provided in RCW 60.28, that no claims have been brought to the attention of the Port, that the Port has no claims under this Contract, and that release of retention has been duly authorized by the State. The following items must also be obtained prior to release of retainage: pursuant to RCW 60.28, a certificate from the Department of Revenue; pursuant to RCW 50.24, a certificate from the Department of Employment Security; and appropriate information from the Department of Labor and Industries including approved affidavits of wages paid for the Contractor and each subcontractor.

7.07 DISPUTED AMOUNTS

- A. Disputed amounts. If the Contractor believes it is entitled to payment for Work performed during the prior calendar month in addition to the agreed-upon amount, the Contractor may submit to the Port, along with the approved Application for Payment, a separate written payment request specifying the exact additional amount claimed to be due, the category in the Schedule of Values to which the payment would apply, the specific Work for which additional payment is sought, and an explanation of why the Contractor believes additional payment is due.

7.08 EFFECT OF PAYMENT

- A. Payment does not relieve Contractor of obligations. Payment to the Contractor of progress payments or final payment does not relieve the Contractor from its responsibility for the Work or its responsibility to repair, replace, or otherwise make good defective Work, materials, or equipment. Likewise, the making of a payment does not constitute a waiver of the Port's right to reject defective or non-conforming Work, materials, or equipment (even though they are covered by the payment), nor is it a waiver of any other rights of the Port.
- B. Acceptance of final payment waives claims. Acceptance of final payment by the Contractor, a Subcontractor of any tier, or a supplier shall constitute a waiver of claims except those previously made in writing and identified as unsettled in Contractor's final Application for Payment.
- C. Execution of Change Order waives claims. The execution of a Change Order shall constitute a waiver of claims by the Contractor arising out of the Work to be performed or deleted pursuant to the Change Order, except as specifically described in the Change Order.

7.09 LIENS

- A. Contractor to discharge liens. The Contractor shall promptly pay (and secure the discharge of any liens asserted by) all persons properly furnishing labor, equipment, materials, or other items in connection with the performance of the Work including, but not limited to, any Subcontractors of any tier.

ARTICLE 8 - CHANGES IN THE WORK

8.01 CHANGES IN THE WORK

- A. Changes in the Work authorized. Without invalidating the Contract and without notice to the Contractor's surety, the Port may authorize changes in the Work after execution of the Contract, including changes in the Contract Sum or Contract Time. Changes shall occur solely by Change Order, Unilateral Change Directive, or Minor Change in Work. All changes in the Work are effective immediately, and the Contractor shall proceed promptly to perform the change, unless otherwise provided in the Change Order or Directive.
- B. Changes in the Work Defined.
 - 1. A Change Order is a written instrument signed by the Port and Contractor stating their agreement to a change in the Work and the adjustment, if any, in the Contract Sum and/or Contract Time.
 - 2. A Unilateral Change Directive is a written instrument issued by the Port to transmit new or revised Drawings, issue additions or modifications to the Contract, furnish other direction and documents adjustment, if any, to the Contract Sum and/or Contract Time. A Unilateral Change Directive is signed only by the Port, without requiring the consent or signature of the Contractor.
 - 3. A Minor Change in the Work is a written order from the Port directing a change that does not involve an adjustment to the Contract Sum or the Contract Time.

- C. Request for Proposal: At any time, the Port may issue a Proposal Request directing the Contractor to propose a change to the Contract Sum and/or Contract Time, if any, based on a proposed change in the Work. The Contractor shall submit a responsive Change Order proposal as soon as possible, and no later than fourteen (14) days after receipt, in which the Contractor specifies in good faith the extent to which the Contract Sum and/or Contract Time would change. All cost components shall be limited to the manner described in Section 8.02(B). If the Contractor fails to timely respond to a Proposal Request, the Port may issue the change as a Unilateral Change Directive.
1. Fixed price method is default for Contractor Change Order proposal. When the Port has requested that the Contractor submit a Change Order proposal, the Port may specify the basis on which the Contract Sum will be adjusted by the Contractor. The Engineer's preference, unless otherwise indicated, is for changes in the Work to be priced using Lump Sums or Unit Prices or on a time and material (Force Account) basis if unit pricing or lump sums cannot be negotiated or determined. In all instances, however, proposed changes shall include a not-to-exceed price for the change and shall be itemized for evaluation purposes in accordance with Section 8.02(B), as requested by the Engineer.
 2. The Port may accept or reject the Contractor's Change Order proposal, request further documentation, or negotiate acceptable terms with the Contractor. If The Port and Contractor reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, such agreement shall be incorporated in a Change Order.
 3. The Change Order shall constitute full payment and final settlement of all claims for time and for direct, indirect, and consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity, related to any Work either covered or affected by the Change Order, or related to the events giving rise to the request for equitable adjustment. The Port may reject a proposal, in which case the Port may either not effectuate the change or issue a Unilateral Change Directive. The Port will not make payment to the Contractor for any work until that work has been incorporated into an executed Change Order.
- D. Unforeseen 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 any soils reports made available by the Port to the Contractor, 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 immediately provide oral notice to the Engineer before conditions are disturbed, followed within 24 hours by an initial written notice. The Contractor shall submit a detailed proposal no later than seven (7) days following discovery of differing site conditions. The Engineer will promptly investigate these conditions and, if the Engineer determines that they differ materially and cause an increase or decrease in the Contractor's cost or time required for performance of any part of the Work, will establish a change in the Contract Sum or Contract Time, or both, consistent with the requirements of the Contract Documents. If the Contractor disputes the Engineer's determination, the Contractor may proceed as provided in the dispute resolution procedure (Article 11). No increase to the Contract Sum or the Contract Time shall be allowed if the Contractor does not comply with the contractual requirements or if the Contractor knew, or reasonably should have known, of the concealed conditions prior to executing the Contract.

- E. Proceed Immediately: Pending agreement on the terms of the Change Order or upon determination of a differing site condition as defined in 8.01(D), the Engineer may direct Contractor to proceed immediately with the change in the Work. Contractor shall not proceed with any change in the Work until it has obtained the Engineer's written approval and documentation of the following:
1. The scope of work
 2. An agreed upon maximum not-to-exceed amount
 3. The method of final cost determination
 4. Estimated time to complete the changed work
 5. As a change in the Work is performed, unless the parties have signed a written Change Order to establish the cost of the change, the Contractor shall maintain an itemized accounting of all costs related to the change based on the categories in Section 8.02(B) and provide such data to the Port upon request. This includes, without limitation, invoices, including freight and express bills, and other support for all material, equipment, Subcontractor, and other charges related to the change and, for material furnished from the Contractor's own inventory, a sworn affidavit certifying the actual cost of such material. Failure to provide data to the Port within seven (7) days of a request constitutes a waiver of any claim. The Port may furnish any material or equipment to the Contractor that it deems advisable, and the Contractor shall have no claim for any costs or fee on such material or equipment.
- F. Procedure for Unilateral Change Directive. Whether or not the Port has rejected a Contractor's proposal, the Port may issue a Unilateral Change Directive and the Contractor shall promptly proceed with the specified Work. If the Contractor disagrees with a Unilateral Change Directive, the Contractor shall advise the Port in writing through a Change Order proposal within seven (7) days of receipt. The Contractor's Change Order proposal shall reasonably specify the reasons for any disagreement and the adjustment it proposes. Without this timely Change Order proposal, the Contractor shall conclusively be deemed to have accepted the Port's proposal.
- G. Payment pending final determination of Force Account work. Pending final determination of the total cost of Force Account Work, and provided that the Work to be performed under Force Account is complete and any reservations of rights have been signed by the Port, the Contractor may request payment for amounts not in dispute in the next Application for Payment accompanied by documentation indicating the parties' agreement. Work done on a Force Account basis must be approved in writing on a daily basis by the Engineer or the Engineer's designee and invoices shall be submitted with an Application for Payment within sixty (60) days of performance of the Work.

8.02 CHANGES IN THE CONTRACT SUM

- A. Port to Decide How Changes are Measured. The Port may elect, in its sole discretion, how changes in the Work will be measured for payment. Change in the Work may be priced on a lump sum basis, through Unit Prices, as Force Account, or by another method documented in the executed Change Order, Unilateral Change Directive, or Minor Change in the Work.
- B. Determination of Cost of Change. The total cost of any change in the Work, including a claim under Article 11, shall not exceed the prevailing cost for the Work in the locality of the Project. In all circumstances, the change in the Work shall be limited to the reasonable, actual cost of the following components:

1. Direct labor costs: These are the actual labor costs determined by the number of additional craft hours at their normal hourly rate necessary to perform a change in the Work. The hourly cost of labor will be based upon the following:
 - a. Basic wages and fringe benefits: The hourly wage (without markup or labor burden) and fringe benefits paid by the Contractor 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 or directly supervising the change in the Work on site. These wages do not include the cost of Contractor's project manager or superintendent or above, and the premium portion of overtime wages is not included unless pre-approved in writing by the Port. Costs paid or incurred by the Contractor for vacations, per diem, subsistence, housing, travel, bonuses, stock options, or discretionary payments to employees are not separately reimbursable. The Contractor shall provide to the Port copies of payroll records, including certified payroll statements for itself and Subcontractors of any tier, upon the Port's request.
 - b. Workers' insurance: 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.
 - c. Federal insurance: Direct contributions required by the Federal Insurance Compensation Act (FICA); Federal Unemployment Tax Act (FUTA); and State Unemployment Compensation Act (SUCA).
2. Direct material costs: This is an itemization, including material invoices, of the quantity and actual cost of additional materials necessary to perform the change in the Work. The cost will be 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 unless approved in advance by the Port.
3. Construction equipment usage costs: This is an itemization of the actual length of time that construction equipment necessary and appropriate for the Work is used solely on the changed Work times the applicable rental cost as established by the lower of the local prevailing rates published in www.equipmentwatch.com, as modified by the AGC/WSDOT agreement, or the actual rate paid to an unrelated third party. If more than one rate is applicable, the lowest available rate will be utilized. Rates and quantities of equipment rented that exceed the local fair market rental costs shall be subject to the Port's prior written approval. Total rental charges for equipment or tools shall not exceed 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. Mobilization and standby costs shall not be charged for equipment already present on the site.

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. No gas surcharges are payable. Equipment not of modern design and/or not in good working condition will have lower rates. Hourly, weekly, and/or monthly rates, as appropriate, will be applied to yield the lowest total cost.

4. Subcontractor costs: These are payments the Contractor makes to Subcontractors for changed Work performed by Subcontractors. The Subcontractors' cost of changed Work shall be determined in the same manner as prescribed in this Section 8.02 and, among other things, shall not include consultant costs, attorneys' fees, or claim preparation expenses.
5. Service provider costs: These are payments the Contractor makes to service providers for changed Work performed by service providers. The service providers' cost of changed Work shall be determined in the same manner as prescribed in this Section 8.02.
6. Markup: This is the maximum total amount for overhead, profit, and other costs, including office, home office and site overhead (including purchasing, project manager, superintendent, project engineer, estimator, and their vehicles and clerical assistants), taxes (except for sales tax on the Contract Sum), warranty, safety costs, printing and copying, layout and control, quality control/assurance, small or hand tools (a tool that costs \$500 or less and is normally furnished by the performing contractor), preparation of as-built drawings, impact on unchanged Work, Change Order and/or claim preparation, and delay and impact costs of any kind (cumulative, ripple, or otherwise), added to the total cost to the Port of any Change Order work. No markup shall be due, however, for direct settlements of Subcontractor claims by the Port after Substantial Completion. The markup shall be limited in all cases to the following schedule:
 - a. Direct labor costs -- 20% markup on the direct cost of labor for the party (Contractor or Subcontractor) providing labor related to the change in the Work;
 - b. Direct material costs -- 20% markup on the direct cost of material for the party (Contractor or Subcontractor) providing material related to the change in the Work;
 - c. Construction equipment usage costs -- 10% markup on the direct cost of equipment for the party (Contractor or Subcontractor) providing equipment related to the change in the Work;
 - d. Contractor markup on Subcontractor costs -- 10% markup for the Contractor on the direct cost (excluding markup) of a change in the Work performed by Subcontractors (and for Subcontractors, for a change in the Work performed by lower-tier Subcontractors); and
 - e. Service provider costs -- 5% markup for the Contractor on the direct cost (excluding markup) of a change in the Work performed by service providers.

The total summed markup of the Contractor and all Subcontractors of any tier shall not exceed 30% of the direct costs of the change in the Work. If the markup would otherwise exceed 30%, the Contractor shall proportionately reduce the markup for the Contractor and all Subcontractors of any tier.
7. Cost of change in insurance or bond premium. This is defined as:
 - a. Contractor's liability insurance: The actual cost (expressed as a percentage submitted with the certificate of insurance provided under the Contract Documents and subject to audit) of the Contractor's liability insurance arising directly from the changed Work; and
 - b. Public works bond: The actual cost (expressed as a percentage submitted under the Contract Documents and subject to audit) of the Contractor's performance and payment bond arising directly from the changed Work.

Upon request, the Contractor shall provide the Port with supporting documentation from its insurer or surety of any associated cost incurred. The cost of the insurance or bond premium together shall not exceed 2.0% of the cost of the changed Work.

8. Unit Prices. If Unit Prices are specified in the Contract Documents or established by agreement of the parties for certain Work, the Port may apply them to the changed Work. Unit Prices shall include pre-agreed rates for material quantities and shall include reimbursement for all direct and indirect costs of the Work, including overhead, profit, bond, and insurance costs arising out of, or related to, the Unit Priced item. Quantities must be supported by field measurement statements signed by the Port, and the Port shall have access as necessary for quantity measurement. The Port shall not be responsible for not-to-exceed limit(s) without its prior written approval.

8.03 CHANGES IN THE CONTRACT TIME

- A. Extension of the Contract Time. If the Contractor is delayed at any time in the commencement or progress of the Work by events for which the Port is responsible, by unanticipated abnormal weather (subject to Section 8.03(E) below), or by other causes not the fault or responsibility of the Contractor that the Port determines may justify a delay in the Contract Time, then the Contract Time shall be extended by Change Order for such reasonable time as the Port may determine. In no event, however, shall the Contractor be entitled to any extension of time absent proof of: (1) delay to an activity on the critical path of the Project, or (2) delay transforming an activity to the critical path, so as to actually delay the anticipated date of Substantial Completion.
- B. Allocation of responsibility for delay not caused by Port or Contractor. If a delay was not caused by the Port, the Contractor, or anyone acting on behalf of any of them, the Contractor is entitled only to an increase in the Contract Time but not an increase in the Contract Sum.
- C. Allocation of responsibility for delay caused by Port. If a delay was caused by the Port or someone acting on behalf of the Port and affected the critical path, the Contractor shall be entitled to a change in the Contract Time and Contract Sum in accordance with Section 8.02. The Contractor shall not recover damages, an equitable adjustment, or an increase in the Contract Sum or Contract Time from the Port; however, where the Contractor could reasonably have avoided the delay. The Port is not obligated directly or indirectly for damages for any delay suffered by a Subcontractor of any tier that does not increase the Contract Time.
- D. Allocation of responsibility for delay caused by Contractor. If a delay was caused by the Contractor, a Subcontractor of any tier, or anyone acting on behalf of any of them, the Contractor is not entitled to an increase in the Contract Time or in the Contract Sum.
- E. Adverse weather. If adverse weather is identified as the basis for a claim for additional time, the claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not reasonably have been anticipated and had an adverse effect on the critical path of construction, and that the Work was on schedule (or not behind schedule through the fault of the Contractor) at the time the adverse weather conditions occurred. Neither the Contract Time nor the Contract Sum will be adjusted for normal inclement weather. For a claim based on adverse weather, the Contractor shall be eligible only for a change in the Contract Time (but not a change in the Contract Sum) if the Contractor can substantiate that there was significantly greater than normal inclement weather considering the full term of the Contract Time.

- F. Damages for delay. In the event the Contractor (including any Subcontractors of any tier) is held to be entitled to damages from the Port for delay beyond the amount permitted in Section 8.02(B), the total combined damages to the Contractor and any Subcontractors of any tier for each day of delay shall be limited to the reasonable, actual costs of the delay for which the Port is wholly responsible. The limitation on damages set forth in this Section does not apply to any damages arising exclusively from delay to which the Contractor is entitled to recover under Section 8.03(F).
- G. Limitation on damages. The Contractor shall not be entitled to damages arising out of loss of efficiency; morale, fatigue, attitude, or labor rhythm; constructive acceleration; home office overhead; expectant under run; trade stacking; reassignment of workers; rescheduling of Work, concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics; ripple; season change; extended or increased overhead or general conditions; profit upon damages for delay; impact damages including cumulative impacts; or similar damages. Any effect that such alleged costs may have upon the Contractor or its Subcontractors of any tier is fully compensated through the markup on Change Orders paid through Section 8.02(B).

8.04 RESERVATION OF RIGHTS

- A. Reservations of rights void unless signed by Port. Reservations of rights will be deemed waived and are void unless any reserved rights are described in detail and are signed by the Contractor and the Port.
- B. Procedure for unsigned reservations of rights. If the Contractor adds a reservation of rights not signed by the Port to any Change Order, Unilateral Change Directive, Change Order proposal, Application for Payment, or any other document, all amounts and all Work therein shall be considered disputed and not payable until costs are re-negotiated or the reservation is withdrawn or changed in a manner satisfactory to, and signed by, the Port. If the Port makes payment based on a document that contains a reservation of rights not signed by the Port, and if the Contractor cashes such payment, then the reservation of rights shall be deemed waived, withdrawn, and of no effect.

8.05 UNIT PRICES

- A. Adjustment to Unit Prices. If Unit Prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed (less than eighty percent (80%) or more than one hundred and twenty percent (120%) of the quantity estimated) so that application of a Unit Price would be substantially unfair, the applicable Unit Price but not the Contract Time, shall be adjusted if the Port prospectively approves a Change Order revising the Unit Price.
- B. Procedure to change Unit Prices. The Contractor or Port may request a Change Order revising a Unit Price by submitting information to support the change. A proposed change to a Unit Price will be evaluated by the Port based on the change in cost resulting solely from the change in quantity, any change in production rate or method as compared to the original plan, and the share, if any, of fixed expenses properly chargeable to the item. If the Port and Contractor agree on the change, a Change Order will be executed. If the parties cannot agree, the Contractor shall comply with the dispute resolution procedures (Article 11).

ARTICLE 9 - SUSPENSION AND TERMINATION OF CONTRACT

9.01 PORT'S RIGHT TO SUSPEND WORK

- A. Port may suspend the Work. The Port may at any time suspend the Work, or any part thereof, by giving notice to the Contractor. The Work shall be resumed by the Contractor as soon as possible, but no later than fourteen (14) days after the date fixed in a notice to resume the Work. The Port shall reimburse the Contractor for appropriate and reasonable expenses consistent with Section 8.02 incurred by the Contractor as a result of the suspension, except where a suspension is the result of the Contractor repeatedly or materially failing to carry out or correct the Work in accordance with the Contract Documents, and the Contractor shall take all necessary steps to minimize expenses.
- B. Contractor obligations. During any suspension of Work, the Contractor shall take every precaution to prevent damage to, or deterioration of, the Work. The Contractor shall be responsible for all damage or deterioration to the Work during the period of suspension and shall, at its sole expense, correct or restore the Work to a condition acceptable to the Port prior to resuming Work.

9.02 TERMINATION OF CONTRACT FOR CAUSE BY THE PORT

- A. Port may terminate for cause. If the Contractor is adjudged bankrupt or makes a general assignment for the benefit of the Contractor's creditors, if a receiver is appointed due to the Contractor's insolvency, or if the Contractor, in the opinion of the Port, persistently or materially refuses or fails to supply enough properly skilled workmen or materials for proper completion of the Contract, fails to make prompt payment to Subcontractors or suppliers for material or labor, disregards laws, ordinances, or the instructions of the Port, fails to prosecute the Work continuously with promptness and diligence, or otherwise materially violates any provision of the Contract, then the Port, without prejudice to any other right or remedy, may terminate the Contractor after giving the Contractor seven (7) days' written notice (during which period the Contractor shall have the right to cure).
- B. Procedure following termination for cause. Following a termination for cause, the Port may take possession of the Project site and all materials and equipment, and utilize such materials and equipment to finish the Work. The Port may also exclude the Contractor from the Project site(s). If the Port elects to complete all or a portion of the Work, it may do so as it sees fit. The Port shall not be required to accept the lowest bid for completion of the Work and may choose to complete all or a portion of the Work using its own work force. If the Port elects to complete all or a portion of the Work, the Contractor shall not be entitled to any further payment until the Work is finished. If the expense of finishing the Work, including compensation for additional managerial and administrative services of the Port, exceeds the unpaid balance of the Contract Sum, the excess shall be paid by the Contractor.
- C. Port's remedies following termination for cause. The Port may exercise any rights, claims, or demands that the Contractor may have against third persons in connection with the Contract, and for this purpose the Contractor assigns and transfers to the Port all such rights, claims, and demands.
- D. Inadequate termination for cause converted to termination for convenience. If, after the Contractor has been terminated for cause, it is determined that inadequate "cause" for such termination exists, then the termination shall be considered a termination for convenience pursuant to Section 9.03.

9.03 TERMINATION OF CONTRACT FOR CONVENIENCE BY THE PORT

- A. Port may terminate for convenience. The Port may, at any time (without prejudice to any right or remedy of the Port), terminate all, or any portion of, the Contract for the Port's convenience and without cause. The Contractor shall be entitled to receive payment consistent with the Contract Documents only for Work properly executed through the date of termination, and costs necessarily incurred by reason of the termination (such as the cost of settling and paying claims arising out of the termination under subcontracts or orders), along with a fee of one percent (1%) of the Contract Sum not yet earned on the whole or part of the Work. The total amount to be paid to the Contractor shall not exceed the Contract Sum as reduced by the amount of payments otherwise made. The Port shall have title to all Work performed through the date of termination.

9.04 TERMINATION OF CONTRACT BY THE CONTRACTOR

- A. Contractor may terminate for cause. The Contractor may terminate the Contract if the Work is stopped for a period of sixty (60) consecutive days through no act or fault of the Contractor or a Subcontractor of any tier, for either 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; or
 - 2. An act of government, such as a declaration of national emergency, that requires all Work to be stopped.
- B. Procedure for Contractor termination. If one of the reasons described in Section 9.04A exists, the Contractor may, upon seven (7) days' written notice to the Port (during which period the Port has the opportunity to cure), terminate the Contract and recover from the Port payment for Work executed through the date of termination in accordance with the Contract Documents and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit on Work executed and direct costs incurred by reason of such termination. The total recovery of the Contractor shall not exceed the unpaid balance of the Contract Sum.
- C. Contractor may stop the Work for failure of Port to pay undisputed amounts. The Contractor may stop Work under the Contract if the Port does not pay undisputed amounts due and owing to the Contractor within fifteen (15) days of the date established in the Contract Documents. If the Port fails to pay undisputed amounts, the Contractor may, upon fifteen (15) additional days' written notice to the Port, during which the Port can cure, 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 shut-down, delay, and start-up.

9.05 SUBCONTRACT ASSIGNMENT UPON TERMINATION

- A. Subcontracts assigned upon termination. Each subcontract is hereby assigned by the Contractor to the Port provided that:
 - 1. The Port requests that the subcontract be assigned.
 - 2. The assignment is effective only after termination by the Port and only for those subcontracts that the Port accepts in writing.
 - 3. The assignment is subject to the prior rights of the surety, if any, under any bond issued in accordance with the Contract Documents.

When the Port accepts the assignment of a subcontract, the Port assumes the Contractor's rights and obligations under the subcontract, but only for events and payment obligations that arise after the date of the assignment.

ARTICLE 10 - BONDS

10.01 CONTRACTOR PERFORMANCE AND PAYMENT BONDS

- A. Contractor to furnish performance and payment bonds. Within ten (10) days following its receipt of a notice of award, and as part of the Contract Sum, the Contractor shall secure and furnish duly executed performance and payment bonds using the forms furnished by the Port. The bonds shall be executed by a surety (or sureties) reasonably acceptable to the Port, admitted and licensed in the State of Washington, registered with the Washington State Insurance Commissioner, and possessing an A.M. Best rating of "A-, FSC (6)" or better and be authorized by the U.S. Department of the Treasury. Pursuant to RCW 39.08, the bonds shall be in an amount equal to the Contract Sum, and shall be conditioned only upon the faithful performance of the Contract by the Contractor within the Contract Time and upon the payment by the Contractor of all taxes, fees, and penalties to the State of Washington and all laborers, Subcontractors, and suppliers, and others who supply provisions, equipment, or supplies for the performance of the Work covered by this Contract. The bonds shall be signed by the person or persons legally authorized to bind the Contractor.
- B. On contracts of one hundred fifty thousand dollars or less, at the option of the contractor as defined in RCW 39.10.210, the Port may, in lieu of the bond, retain ten percent of the contract amount for a period of thirty days after date of final acceptance, or until receipt of all necessary releases from the department of revenue, the Employment Security Department, and the Department of Labor and Industries and settlement of any liens filed under chapter 60.28 RCW, whichever is later. The recovery of unpaid wages and benefits must be the first priority for any actions filed against retainage held by a state agency or authorized local government.

For contracts of one hundred fifty thousand dollars or less, the Port may accept a full payment and performance bond from an individual surety or sureties.
- C. Port may notify surety. If the Port makes or receives a claim against the Contractor, the Port may, but is not obligated to, notify the Contractor's surety of the nature and amount of the claim. If the claim relates to a possibility of a Contractor's default, the Port may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

ARTICLE 11 - DISPUTE RESOLUTION

11.01 NOTICE OF PROTEST AND CLAIM

- A. Dispute resolution procedure mandatory. All claims, direct or indirect, arising out of, or relating to, the Contract Documents or the breach thereof, shall be decided exclusively by the following alternative dispute resolution procedure, unless the parties mutually agree otherwise. If the Port and Contractor agree to a partnering process to assist in the resolution of disputes, the partnering process shall occur prior to, and not be in place of, the mandatory dispute resolution procedures set forth below.

- B. Notice of protest defined. Except for claims requiring notice before proceeding with the affected Work as otherwise described in the Contract Documents, the Contractor shall provide immediate oral notice of protest to the Engineer prior to performing any disputed Work and shall submit a written notice of protest to the Port within seven (7) days of the occurrence of the event giving rise to the protest that includes a clear description of the event(s). The protest shall identify any point of disagreement, those portions of the Contract Documents believed to be applicable, and an estimate of quantities and costs involved. When a protest relates to cost, the Contractor shall keep full and complete records and shall permit the Port to have access to those records at any time as requested by the Port.
- C. Claim defined. A claim is a demand by one of the parties seeking adjustment or interpretation of the Contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract Documents. The term "claim" also includes all disputes and matters in question between the Port and Contractor arising out of, or relating to, the Contract Documents. Claims must be initiated in writing and include a detailed factual statement and clear description of the claim providing all necessary dates, locations, and items of Work, the date or dates on which the events occurred that give rise to the claim, the names of employees or representatives knowledgeable about the claim, the specific provisions of the Contract Documents that support the claim, any documents or oral communications that support the claim, any proposed change in the Contract Sum (showing all components and calculations) and/or Contract Time (showing cause and analysis of the resultant delay in the critical path), and all other data supporting the claim. Claims shall also be submitted with a statement certifying, under penalty of perjury, that the claim as submitted is made in good faith, that the supporting cost and pricing data are true and accurate to the best of Contractor's knowledge and belief, that the claim is fully supported, and that the amount requested accurately reflects the adjustment in the Contract Sum or Contract Time for which Contractor believes the Port is liable. A claim shall be deemed to include all changes, direct and indirect, in cost and in time to which the Contractor and Subcontractors of any tier are entitled and may not contain reservations of rights without the Port's written approval; any unapproved reservations of rights shall be without effect.
- D. Claim procedure. The Contractor shall submit a written claim within thirty (30) days of providing written notice of protest. The Contractor may delay submitting supporting data by an additional thirty (30) days if it notifies the Port in its claim that substantial data must be assembled. Any claim of a Subcontractor of any tier may be brought only through, and after review by and concurrence of, the Contractor.
- E. Failure to comply with notice of protest and claim requirements waives claims. Any notice of protest by the Contractor and any claim of the Contractor, whether under the Contract or otherwise, must be made pursuant to, and in strict accordance with, the applicable provisions of the Contract. Failure to properly and timely submit a notice of protest or to timely submit a claim shall waive the claim. No act, omission, or knowledge, actual or constructive, of the Port shall waive the requirement for timely written notice of protest and a timely written claim, unless the Port and the Contractor sign an explicit, unequivocal written waiver approved by the Port. The Contractor expressly acknowledges and agrees that the Contractor's failure to timely submit required notices of protest and/or timely submit claims has a substantial impact upon, and prejudices, the Port. For the purpose of calculating time periods, an "event giving rise to a claim," among other things, is not a Request for Information, but rather is a response that the Contractor believes would change the Contract Sum and/or Contract Time.

- F. False claims. The Contractor shall not make any fraudulent misrepresentations, concealments, errors, omissions, or inducements to the Port in the formation or performance of the Contract. If the Contractor or a Subcontractor of any tier submits a false or frivolous claim to the Port, which for purposes of this Section 11.01(F) is defined as a claim based in whole or in part on a materially incorrect fact, statement, representation, assertion, or record, the Port shall be entitled to collect from the Contractor by offset or otherwise (without prejudice to any right or remedy of the Port) any and all costs and expenses, including investigation and consultant costs, incurred by the Port in investigating, responding to, and defending against the false or frivolous claim.
- G. Compliance with lien and retainage statutes required. If a claim relates to, or is the subject of, a lien or retainage claim, the party asserting the claim may proceed in accordance with applicable law to comply with the notice and filing deadlines prior to resolution of the claim by mediation or by litigation.
- H. Performance required pending claim resolution. Pending final resolution of a claim, the Contractor shall continue to perform the Contract and maintain the Baseline Project Schedule, and the Port shall continue to make payments of undisputed amounts due in accordance with the Contract Documents.

11.02 MEDIATION

- A. Claims must be subject to mediation. At any time following the Port's receipt of a written claim, the Port may require that an officer of the Contractor and the Port's designee (all with authority to settle) meet, confer, and attempt to resolve a claim. If the claim is not resolved during this meeting, the claim shall be subject to mandatory mediation as a condition precedent to the initiation of litigation. This requirement can be waived only by an explicit, written waiver signed by the Port and the Contractor.
- B. Mediation procedure. A request for mediation shall be filed in writing with the other party to the Contract, and the parties shall promptly attempt to agree upon a mediator. If the parties have not reached agreement within thirty (30) days of the request, either party may file the request with the American Arbitration Association, or such other alternative dispute resolution service to which the parties mutually agree, with a copy to the other party, and the mediation shall be administered by the American Arbitration Association (or other agreed service). The parties to the mediation shall share the mediator's fee and any filing fees equally. The mediation shall be held in Pierce County, Washington, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof. Unless the Port and the Contractor mutually agree in writing otherwise, all claims shall be considered at a mediation session that shall occur prior to Final Completion.

11.03 LITIGATION

- A. Claims not resolved by mediation are subject to litigation. Claims not resolved through mediation shall be resolved by litigation, unless the parties mutually agree otherwise. The venue for any litigation shall be Pierce County, Washington. The Contractor may bring no litigation on claims, unless such claims have been properly raised and considered in the procedures of this Article 11. The Contractor must demonstrate in any litigation that it complied with all requirements of this Article.

- B. Litigation must be commenced promptly. All unresolved claims of the Contractor shall be waived and released, unless the Contractor has complied with the requirements of the Contract Documents, and litigation is served and filed within 180 days of the date of Substantial Completion approved in writing by the Port or termination of the Contract. The pendency of mediation (the time period between receipt by the non-requesting party of a written mediation request and the date of mediation) shall toll these deadlines until the earlier of the mediator providing written notice to the parties of impasse, or thirty (30) days after the date of the mediation session.
- C. Port not responsible for attorneys' fees. Neither the Contractor nor a Subcontractor of any tier, whether claiming under a bond or lien statute or otherwise, shall be entitled to attorneys' fees directly or indirectly from the Port (but may recover attorneys' fees from the bond or statutory retainage fund itself to the extent allowable under law).
- D. Port may join Contractor in dispute. The Port may join the Contractor as a party to any litigation or arbitration involving the alleged fault, responsibility, or breach of contract of the Contractor or Subcontractor of any tier.

ARTICLE 12 - MISCELLANEOUS

12.01 GENERAL

- A. Rights and remedies are cumulative. The rights and remedies of the Port set forth in the Contract Documents are cumulative, and in addition to and not in limitation of, any rights and remedies otherwise available to the Port. The pursuit of any remedy by the Port shall not be construed to bar the Port from the pursuit of any other remedy in the event of similar, different, or subsequent breaches of this Contract. All such rights of the Port shall survive completion of the Project or termination of the Contractor.
- B. Reserved rights do not give rise to duty. The rights reserved or possessed by the Port to take any action shall not give rise to a duty for the Port to exercise any such right.

12.02 WAIVER

- A. Waiver must be in writing and authorized by Port. Waiver of any provisions of the Contract Documents must be in writing and authorized by the Port. No other waiver is valid on behalf of the Port.
- B. Inaction or delay not a waiver. No action, delay in acting, or failure to act by the Port shall constitute a waiver of any right or remedy of the Port, or constitute an approval or acquiescence of any breach or defect in the Work, nor shall any delay or failure of the Port to act waive or otherwise prejudice the right of the Port to enforce a right or remedy at any subsequent time.
- C. Claim negotiation not a waiver. The fact that the Port and the Contractor may consider, discuss, or negotiate a claim that has or may have been defective or untimely under the Contract, shall not constitute a waiver of the provisions of the Contract Documents, unless the Port and the Contractor sign an explicit, unequivocal waiver.

12.03 GOVERNING LAW

- A. Washington law governs. This Contract and the rights and duties of the parties hereunder shall be governed by the internal laws of the State of Washington, without regard to its conflict of law principles.

12.04 COMPLIANCE WITH LAW

- A. Contractor to comply with applicable laws. The Contractor shall at all times comply with all applicable Federal, State and local laws, ordinances, and regulations. This compliance shall include, but is not limited to, the payment of all applicable taxes, royalties, license fees, penalties, and duties.
- B. Contractor to provide required notices. The Contractor shall give notices required by all applicable Federal, State and local laws, ordinances, and regulations bearing on the Work.
- C. Contractor to confine operations at site to permitted areas. The Contractor shall confine operations at the Project site to areas permitted by applicable laws, ordinances, permits, rules and regulations, and lawful orders of public authorities and the Contract Documents.

12.05 ASSIGNMENT

- A. Assignment. The Port and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party and to the partners, successors, assigns, and legal representatives of such other party. The Contractor may not assign, transfer, or novate all or any portion of the Contract, including but not limited to, any claim or right to the Contract Sum, without the Port's prior written consent. If the Contractor attempts to make an assignment, transfer, or novation without the Port's consent, the assignment shall be of no effect, and Contractor shall nevertheless remain legally responsible for all obligations under the Contract. The Contractor also shall not assign or transfer, to any third party, any claims it may have against the Port arising under the Contract or otherwise related to the Project.

12.06 TIME LIMIT ON CAUSES OF ACTION

- A. Time limit on causes of action. The Port and Contractor shall commence all causes of action, whether in contract, tort, breach of warranty, or otherwise, against the other arising out of, or related to, the Contract in accordance with the requirements of the dispute resolution procedure set forth in Article 11 of these General Conditions, within the time period specified by applicable law, and within the time limits identified in the Contract Documents. The Contractor waives all claims and causes of action not commenced in accordance with this Section 12.06.

12.07 SERVICE OF NOTICE

- A. Notice. Written notice under the Contract Documents by either the Contractor or Port may be served on the other party by personal service, electronic or facsimile transmission, or delivery service to the last address provided in writing to the other party. For the purpose of measuring time, notice shall be deemed to be received by the other party on the next business day following the sender's electronic or facsimile transmittal or delivery by delivery service.

12.08 RECORDS

- A. Contractor and Subcontractors to maintain records and cooperate with Port audit. The Contractor and Subcontractors of any tier shall maintain books, ledgers, records, documents, estimates, bids, correspondence, logs, schedules, emails, and other tangible and electronic data and evidence relating or pertaining to costs and/or performance of the Contract (“records”) to such extent, and in such detail, as will properly reflect and fully support compliance with the Contract Documents and with all costs, charges, and other amounts of whatever nature. The Contractor shall preserve these records for a period of six (6) years following the date of Final Acceptance under the Contract. Within seven (7) days of the Port’s request, both during the Project and for six (6) years following Final Acceptance, the Contractor and Subcontractors of any tier shall make available, at their office during normal business hours, all records for inspection, audit, and reproduction (including electronic reproduction) by the Port or its representatives; failure to fully comply with this requirement shall constitute a material breach of contract and a waiver of all claims by the Contractor and Subcontractors of any tier.
- B. Rights under RCW 42.56. The Contractor agrees, on behalf of itself and Subcontractors of any tier, that any rights under Chapter 42.56 RCW will commence at Final Acceptance, and that the invocation of such rights at any time by the Contractor or a Subcontractor of any tier, or their respective representatives, shall initiate an equivalent right to disclosures from the Contractor and Subcontractors of any tier for the benefit of the Port.

12.09 STATUTES

- A. Contractor to comply with Washington statutes. The Contractor shall abide by the provisions of all applicable statutes, regulations, and other laws. Although a number of statutes are referenced in the Contract Documents, these references are not meant to be, and are not, a complete list.
 - 1. Pursuant to RCW 39.06, “Registration, Licensing of Contractors,” the Contractor shall be registered and licensed as required by the laws of the State of Washington, including but not limited to RCW 18.27, “Registration of Contractors,” and shall satisfy all State of Washington bonding and insurance requirements. The Contractor shall also have a current state Unified Business Identifier number; have industrial insurance coverage for the Contractor’s employees working in Washington as required by Title 51 RCW; have an Employment Security Department number as required by Title 50 RCW; have a state excise tax registration number as required in Title 82 RCW; and not be disqualified from bidding on any public works contract under RCW 39.06.010 (unregistered or unlicensed contractors) or RCW 39.12.065(3) (prevailing wage violations).
 - 2. The Contractor shall comply with all applicable provisions of RCW 49.28, “Hours of Labor.”
 - 3. The Contractor shall comply with pertinent statutory provisions relating to public works of RCW 49.60, “Discrimination.”
 - 4. The Contractor shall comply with pertinent statutory provisions relating to public works of RCW 70.92, “Provisions in Buildings for Aged and Handicapped Persons,” and the Americans with Disabilities Act.
 - 5. Pursuant to RCW 50.24, “Contributions by Employers,” in general, and RCW 50.24.130 in particular, the Contractor shall pay contributions for wages for personal services performed under this Contract or arrange for an acceptable bond.
 - 6. The Contractor shall comply with pertinent provisions of RCW 49.17, “Washington Industrial Safety and Health Act,” and Chapter 296-155 WAC, “Safety Standards for Construction Work.”

7. Pursuant to RCW 49.70, "Worker and Community Right to Know Act," and WAC 296-62-054 et seq., the Contractor shall provide to the Port, and have copies available at the Project site, a workplace survey or material safety data sheets for all "hazardous" chemicals under the control or use of Contractor or any Subcontractor of any tier.
8. All products and materials incorporated into the Project as part of the Work shall be certified as "asbestos-free" and "lead-free" by United States standards, and shall also be free of all hazardous materials or substances. At the completion of the Project, the Contractor shall submit certifications of asbestos-free and of lead-free materials certifying that all materials and products incorporated into the Work meet the requirements of this Section, and shall also certify that materials and products incorporated into the Work are free of hazardous materials and substances.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes requirements for the Contractor's insurance.

1.02 SUBMITTAL REQUIREMENTS

- A. Evidence of the required insurance within ten (10) days of the issued Notice of Award to the Contractor.
- B. Updated evidence of insurance as required until final completion.

1.03 COMMERCIAL GENERAL LIABILITY (CGL) INSURANCE

- A. The Contractor shall secure and maintain until Final Completion, at its sole cost and expense, the following insurance in carriers reasonably acceptable to the Port, licensed in the State of Washington, registered with the Washington State Insurance Commissioner, and possessing an A.M. Best rating of "A-, FSC six (6)" or better.
- B. The Port of Tacoma (Port) will be included as additional insureds for both ongoing and completed operations by endorsement to the policy using ISO Form CG 20 10 11 85 or forms CG 20 10 04 13 and CG 20 37 04 13 (or equivalent coverage endorsements). The inclusion of the Port as additional insureds shall not create premium liability for the Port.

Also, by endorsement to the policy, there shall be:

- 1. An express waiver of subrogation in favor of the Port;
 - 2. A cross liabilities clause; and
 - 3. An endorsement stating that the Contractor's policy is primary and not contributory with any insurance carried by the Port.
- C. If the Contractor, Supplier, or Subcontractors will perform any work requiring the use of a licensed professional, per RCW 18, the Contractor shall provide evidence to the Port of professional liability insurance in amounts not less than \$1,000,000.
 - D. This insurance shall cover all of the Contractor's operations, of whatever nature, connected in any way with the Contract, including any operations performed by the Contractor's Subcontractors of any tier. **It is the obligation of the Contractor to ensure that all Subcontractors (at whatever level) carry a similar program that provides the identified types of coverage, limits of liability, inclusion of the Port as additional insured(s), waiver of subrogation and cross liabilities clause.** The Port reserves the right to reject any insurance policy as to company, form, or substance. Contractor's failure to provide, or the Port's acceptance of, the Contractor's certificate of insurance does not waive the Contractor's obligation to comply with the insurance requirements of the Contract as specifically described below:
 - 1. Commercial General Liability Insurance on an Occurrence Form Basis including, but not limited to:
 - a. Bodily Injury Liability;
 - b. Property Damage Liability;
 - c. Contractual Liability;
 - d. Products - Completed Operations Liability;

- e. Personal Injury Liability;
Alternatively, a Commercial General Liability (CGL) policy is acceptable if all of the above coverages are incorporated in the policy and there are no marine exclusions that will remove coverage for either vessels or work done by or above or around the water.
 2. Comprehensive Automobile Liability including, but not limited to:
 - a. Bodily Injury Liability;
 - b. Property Damage Liability;
 - c. Personal Injury Liability;
 - d. Owned and Non-Owned Automobile Liability; and
 - e. Hired and Borrowed Automobile Liability.
 3. Contractor's Pollution Liability (CPL) covering claims for bodily injury, property damage and cleanup costs, and environmental damages from pollution conditions arising from the performance of covered operations.
 - a. If the Work involves remediation or abatement of regulated waste to include, but not limited to asbestos containing materials, lead containing products, mercury, PCB, underground storage tanks, or other hazardous materials or substances, the CPL policy shall not exclude such coverage, or a specific policy covering such exposure shall be required from the Contractor and all Subcontractors performing such Work.
 - b. If the Work involves transporting regulated materials or substances or waste, a separate policy or endorsement to the CPL policy specifically providing coverage for liability and cleanup arising from an upset or collision during transportation of hazardous materials or substances shall be required from the Contractor and all Subcontractors performing such Work.
 - c. It is preferred that CPL insurance shall be on a true occurrence form without a sunset clause. However, if CPL insurance is provided on a Claims Made basis, the policy shall have a retroactive date prior to the start of this project, and this insurance shall be kept in force for at least three years after the final completion of this project. Alternatively, the contractor, at its option, may provide evidence of extended reporting period of not less than three (3) years in its place. The Contractor shall be responsible for providing the Port with certificates of insurance each year evidencing this coverage.
 - d. The Port shall be named as an additional insured(s) on the CPL policy.
 4. Technology Professional Liability Errors and Omissions Insurance appropriate to the Consultant's profession and work hereunder, with limits not less than \$2,000,000 per occurrence. Coverage shall be sufficiently broad to respond to the duties and obligations as is undertaken by the Vendor in this agreement and shall include, but not be limited to, claims involving infringement of intellectual property, copyright, trademark, invasion of privacy violations, information theft, release of private information, extortion and network security. The policy shall provide coverage for breach response costs as well as regulatory fines and penalties as well as credit monitoring expenses with limits sufficient to respond to these obligations.

The policy shall include, or be endorsed to include, **property damage liability coverage** for damage to, alteration of, loss of, or destruction of electronic data and/or information "property" of the Agency in the care, custody, or control of the Vendor.
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- E. Except where indicated above, the limits of all insurance required to be provided by the Contractor shall be not less than \$2,000,000 for each occurrence. If the coverage is aggregated, the coverage shall be not less than two times the per occurrence or per claim limit. However, coverage in the amounts of these minimum limits shall not be construed as to relieve the Contractor from liability in excess of such limits. Any additional insured endorsement shall NOT be limited to the amounts specified by this Contract, unless expressly waived in writing by the Port.
- F. Contractor shall certify that its operations are covered by the Washington State Worker's Compensation Fund. The Contractor shall provide its Account Number or, if self-insured, its Certificate of Qualification Number. The Contractor shall also provide evidence of Stop-Gap Employers' Liability Insurance.
- G. The Contractor shall furnish, within ten (10) days following issuance of the Notice of Award, a certificate of insurance satisfactory to the Port evidencing that insurance in the types and minimum amounts required by the Contract Documents has been secured. The Certificate of Insurance shall be signed by an authorized representative of the insurer together with a copy of the endorsement, which shows that the Port are named as additional insured(s).
- H. Contractor shall provide at least forty-five (45) days prior written notice to the Port of any termination or material change, or ten (10) day's-notice in the case of non-payment of premium(s).
- I. If the Contractor is required to make corrections to the Work after Final Completion, the Contractor shall obtain at its own expense, prior to the commencement of any corrective work, insurance coverage as required by the Contract Documents, which coverage shall be maintained until the corrections to the Work have been completed and accepted by the Port.

1.04 BUILDER'S RISK INSURANCE

- A. Until Final Completion of the Work, the construction Work is at the risk of the Contractor and no partial payment shall constitute acceptance of the Work or relieve the Contractor of responsibility of completing the Work under the Contract.
- B. To the extent the Work provided under this Contract does not include the construction, rehabilitation or repair of any dam, road or bridge, and whenever the estimated cost of the Work is less than \$5,000,000, the Port and Contractor acknowledge that the Port will purchase, or has purchased, from a company or companies lawfully authorized and admitted to do business in Washington, property insurance written on a Builder's Risk "all-risk" (including Earthquake and Flood with applicable sub-limits) or equivalent policy form to cover the course of construction in the amount of the full insurable value thereof. This property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Port has an insurable interest in the property, whichever is later. Without further endorsement, the coverage afforded by this insurance includes the interests of the Port, the Contractor, and Subcontractors of any tier on the Project. Coverage for materials intended to be installed in the facility will be covered by the Builder's Risk policy. Losses up to the deductible amount, and payment of any deductible amount, shall be the responsibility of the Contractor. All tools and equipment not intended as part of the construction or installation (including but not limited to Contractor's equipment and tools) will NOT be covered by the policy.

C. To the extent the Work provided under this Contract involves any dam, roadway or bridge, the value of which exceeds \$250,000, or whenever the estimated cost of the Work is equal to or greater than \$5,000,000, Contractor will purchase from a company or companies lawfully authorized and admitted to do business in Washington, property insurance written on a Builder's Risk "all-risk" (excluding Earthquake and Flood with applicable sub-limits) or equivalent policy form to cover the course of construction in the amount of the full insurable value thereof. This Builder's Risk insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Port has an insurable interest in the property, whichever is later. Contractor shall provide evidence satisfactory to the Port confirming the coverage afforded by this insurance shall include the interests of the Port, the Contractor, and Subcontractors of any tier on the Project. Coverage for materials intended to be installed in the facility will be covered by the Builder's Risk policy purchased by the Contractor. Losses up to the deductible amount, and payment of any deductible amount, shall be the responsibility of the Contractor.

In all instances, the Contractor shall obtain property insurance for all Contractor-owned equipment and tools and, in the event of loss, payment of any deductible amount shall be the responsibility of the Contractor.

PART 2 - PRODUCTS - NOT USED

PART 3 - PRODUCTS - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 PREVAILING AND OTHER REQUIRED WAGES

- A. The Contractor shall pay (and shall ensure that all Subcontractors of any tier pay) all prevailing wages and other wages (such as Davis-Bacon Act wages) applicable to the Project.
- B. Pursuant to RCW 39.12, "Prevailing Wages on Public Works," no worker, laborer, or mechanic employed in the performance of any part of the Work shall be paid less than the "prevailing rate of wage" in effect as of the date that bids are due.
 - 1. Based on the Bid Date, the applicable effective date for prevailing wages for this Project is January 28th, 2026.
- C. The State of Washington prevailing wage rates applicable for this public works Project, which is located in Pierce County, may be found at the following website address of the Department of Labor and Industries:

<https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx>
- D. The schedule of the prevailing wage rates is made a part of the Contract Documents by reference as though fully set forth herein, and a printed copy of the applicable prevailing wage rates are also available for viewing at the Port Administration Building, located at 1 Sitcum Plaza, Tacoma, WA 98421 (253-383-5841). Upon request to the Procurement Department at procurement@portoftacoma.com, the Port will email or mail a hard copy of the applicable Journey Level prevailing wages for this Project.
- E. Questions relating to prevailing wage data should be addressed to the Industrial Statistician.
 - Mailing Address: Washington State Department of Labor and Industries
Prevailing Wage Office
P.O. Box 44540
Olympia, WA 98504
 - Telephone: (360) 902-5335
 - Facsimile: (360) 902-5300
 - 1. If there is any discrepancy between the provided schedule of prevailing wage rates and the published rates applicable under WAC 296-127-011, the applicable published rates shall apply with no increase in the Contract Sum. It is the Contractor's responsibility to ensure that the correct prevailing wage rates are paid.
- F. Statement to Pay Prevailing Wages
 - 1. Prior to any payment being made by the Port under this Contract, the Contractor, and each Subcontractor of any tier, shall file a Statement of Intent to Pay Prevailing Wages with the Department of Labor and Industries for approval.
 - 2. The statement shall include the hourly wage rate to be paid to each classification of workers entitled to prevailing wages, which shall not be less than the prevailing rate of wage, and the estimated number of workers in each classification employed on the Project by the Contractor or a Subcontractor of any tier, as well as the Contractor's contractor registration number and other information required by the Department of Labor and Industries.

3. The statement, and any supplemental statements, shall be filed in accordance with the requirements of the Department of Labor and Industries. No progress payment shall be made until the Port receives such certified statement.
- G. The Contractor shall post, in a location readily visible to workers, at the Project site: (i) a copy of the Statement of Intent to Pay Prevailing Wages approved by the Industrial Statistician of the Department of Labor and Industries and (ii) the address and telephone number of the Industrial Statistician of the Department of Labor and Industries to whom a complaint or inquiry concerning prevailing wages may be directed.
- H. If a State of Washington prevailing wage rate conflicts with another applicable wage rate (such as Davis-Bacon Act wage rate) for the same labor classification, the higher of the two shall govern.
- I. Pursuant to RCW 39.12.060, if any dispute arises concerning the appropriate prevailing wage rate for work of a similar nature, and the dispute cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the Department of Labor and Industries, and his or her decision shall be final and conclusive and binding on all parties involved in the dispute.
- J. Immediately following the end of all Work completed under this Contract, the Contractor and each Subcontractor of any tier, shall file an approved Affidavit of Wages Paid with the Department of Labor and Industries.
- K. The Contractor shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold the Port harmless from all liabilities, obligations, claims, demands, damages, disbursements, lawsuits, losses, fines, penalties, costs, and expenses, whether direct, indirect, including, but not limited to, attorneys' fees and consultants' fees and other costs and expenses, from any violation or alleged violation by the Contractor or any Subcontractor of any tier of RCW 39.12 ("Prevailing Wages on Public Works") or RCW Title 51 ("Industrial Insurance"), including, but not limited to, RCW 51.12.050.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 REQUIREMENTS APPLICABLE PORT-WIDE

- A. The Contractor shall submit, prior to the start of Work, a list of emergency contact numbers for itself and its Subcontractors, Suppliers, and manufacturer representatives. Each person on the Project site shall have a valid identification card that is tamper proof with laminated photo identification, such as one (1) of the following:
1. State-issued Driver's license (also required if driving a vehicle)
 2. Card issued by a governmental agency
 3. Passport
 4. Pacific Maritime Association card
 5. Labor organization identification card
- B. Identification cards shall be visible while on the Project site or easily displayed when requested.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE

- A. The accompanying Drawings and Specifications show and describe the location and type of Work to be performed under this project. Work is more specifically defined on the drawings listed in Section 00 01 15.
 - 1. The Work under this contract is to provide, furnish and install all labor, materials and equipment required to complete the work, installed, tested, and ready for use, and as described in these documents.
 - 2. The EBC Silverback Temporary Relocation consists of: Procurement and installation of a prefabricated metal building, including all associated electrical systems; procurement and installation of two modular office buildings and one double-sided modular restroom; connection of the modular offices and restroom facilities to existing utilities; procurement and installation of perimeter fencing; and completion of other miscellaneous tasks as outlined in the project documents.
- B. The accompanying Specifications describe the location and type of Work to be performed under this project.

1.02 LOCATION

- A. The work is located at:
401 Alexander Ave, Tacoma, WA 98421

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies work sequence and constraints.
- B. The purpose of the milestones, sequence and limitations of construction are to ensure that the Contractor understands the requirements and limitations on its work by the specific characteristics of the Contract, schedules and conducts work in a manner consistent with achieving these purposes, and complies with the construction schedule, the specific sequence, constraints, milestones and limitations of work specified.
- C. Sequence of construction. Plan the sequence of construction to accommodate all the requirements of the specifications. The Contract Price shall include all specified requirements as described in this Section.

1.02 CONTRACTOR ACCESS AND USE OF PREMISES

- A. Activity Regulations
 - 1. Ensure Contractor personnel deployed to the project become familiar with and follow all regulations or restrictions established by the Engineer.
- B. Occupied Building
 - 1. The Contractor will be working next to existing buildings which are occupied during normal business hours, 6:00 AM - 4:00 PM.
 - 2. Protect materials and equipment in areas adjoining the immediate work area.
- C. Working Facility
 - 1. The yard and buildings in the area of the work will remain in operation for the duration of construction. The Contractor shall conduct all items of the Work in such a manner as to prevent interference with the normal operations of the Facility.
- D. Work Site Regulations
 - 1. Keep within the limits of work and assigned avenues of ingress and egress. Do not enter any areas outside the designated work location unless previously approved by the Engineer. The Contractor must comply with the following conditions:
 - a. Restore all common areas to a clean and useable condition that permits the resumption of Tenant operations after the Contractor ceases daily work.
 - b. Be responsible for control and security of Contractor-owned equipment and materials at the work site. Report to Port Security (phone (253) 383-9472) any missing/lost/stolen property.
 - c. Ensure all materials, tools and equipment will be removed from the site or secured within the designated laydown area at the end of each shift.

1.03 CONSTRAINTS - GENERAL

- A. Constraints for Work at Site
 - 1. Excavation Work Constraints:

- a. The contractor shall sawcut, excavate, and restore asphalt as necessary to connect the modular units to utilities, including power, sewer, water, and communication. All work must be coordinated with Port maintenance and performed in compliance with applicable codes and standards. Refer to Appendix H for photographs of existing site conditionS.
2. Other:
 - a. As part of the permit requirements, before the contractor can mobilization to the job site or begin any work onsite, the contractor will be required to hold a preconstruction meeting with the City of Tacoma. The Contractor will also be required submit a Site Safety Plan to the City of Tacoma.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Procedures for preparation and submittal of applications for progress payments.

1.02 PAYMENT PROCEDURES

- A. Monthly pay estimates shall clearly identify the work performed for the given time period based on the approved Schedule of Values.
 - 1. At the Pre-construction meeting, the Engineer and the Contractor shall agree upon a date each month when payment applications shall be submitted.
- B. For each pay estimate the Contractor shall submit the following:
 - 1. Completed Contractor invoice and updated Schedule of Values tracking sheet as required by Division 01 or as established by the Engineer.
 - 2. Baseline Project Schedule and narrative updated as required by Section 01 32 16 of the Project Manual.
 - 3. Completed "Amounts Paid to Subcontracts and Suppliers" showing total contract amount, amount paid this estimate, total paid to date, and balance owing.
 - 4. Completed "Conditional Release and Waiver of Liens and Claims."
 - 5. An estimated cashflow statement projecting the Contractor's monthly billings on the project shall be submitted with each payment application.
- C. Prior to submitting a payment application, the Contractor and Engineer shall meet each month to review the work accomplished to determine the actual quantities including labor, materials and equipment charges to be billed.
 - 1. Prior to the payment application meeting, the Contractor shall submit to the Engineer all measurement documentation as referenced in these contract documents; to include all measurement by weight, volume or field.
 - 2. For all change work being done on a force account basis, the Contractor shall submit prior to meeting with Engineer all Force Account back-up documentation as required to process the payment application where Force Account work is being billed. The Engineer and the Contractor shall review the documentation at the payment application meeting to verify quantities and review the work accomplished.
 - 3. The Contractor shall bring a copy of all documentation to the pay application meeting with the Engineer.
 - 4. The Contractor shall submit the updated baseline project schedule for review prior to submitting the payment application to ensure the payment processing is not held up due to necessary schedule revisions.
- D. Following the Engineers' review, the Contractor shall submit the agreed upon pay estimate electronically, with complete supporting documentation, using Microsoft Dynamics 365, or as directed by Engineer.

1.03 PAYMENT PRICING

- A. Pricing for the various lump sum or unit prices in the Bid Form, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the work in accordance with the requirements of the Contract Documents.
- B. Pricing also includes all costs of compliance with the regulations of public agencies having jurisdiction, including safety and health requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA).
- C. No separate payment will be made for any item that is not specifically set forth in the Bid Form, and all costs therefore shall be included in the prices named in the Bid Form for the various appurtenant items of work.
- D. All other work not specifically mentioned in the measurement and payment sections identified below shall be considered incidental to the work performed and merged into the various unit and lump sum prices bid. Payment for work under one item will not be paid for under any other item.
- E. The Port of Tacoma reserves the right to make changes should unforeseen conditions necessitate such changes. Where work is on a unit price basis, the actual quantities occasioned by such changes shall govern the compensation.

1.04 LUMP SUM MEASUREMENT

- A. Lump sum measurement will be for the entire item, unit of Work, structure, or combination thereof, as specified and as indicated in the Contractor's submitted bid.
 - 1. If the Contractor requests progress payments for lump sum items, such progress payments will be made in accordance with an approved Schedule of Values. The quantity for payment for completed work shall be an estimated percentage of the lump sum amount, agreed to between the Engineer and Contractor, payable in monthly progress payments in increments proportional to the work performed in amounts as agreed between the Engineer and the Contractor.

1.05 MEASUREMENT OF QUANTITIES FOR UNIT PRICES

- A. Measurement Standards:
 - 1. All Work to be paid for at a contract price per unit measurement, as indicated in the Contractor's submitted bid, will be measured by the Engineer in accordance with United States Standard Measures.
- B. Measurement by Weight:
 - 1. Reinforcing steel, steel shapes, castings, miscellaneous metal, metal fabrications, and similar items to be paid for by weight shall be measured by scale or by handbook weights for the type and quantity of material actually furnished and incorporated into the Work.

2. Unless shipped by rail, material to be measured and paid for by weight shall be weighed on sealed scales regularly inspected by the Washington State Department of Agriculture's Weights and Measures Section or its designated representative. Measurement shall be furnished by and at the expense of the Contractor. All weighing, measuring, and metering devices shall be suitable for the purpose intended and shall conform to the tolerances and specifications as outlined in Washington State Department of Transportation Standard Specifications, Division 1, General Requirements, Article 1-09.2, Weighing Equipment.
 3. Provide or utilize platform scales of sufficient size and capacity to permit the entire vehicle or combination of vehicles to rest on the scale platform while being weighed. Combination vehicles may be weighed as separate units provided they are disconnected while being weighed. Scales shall be inspected and certified as often as the Engineer may deem necessary to ascertain accuracy. Costs incurred as a result of regulating, adjusting, testing, inspecting, and certifying scales shall be borne by the Contractor.
 4. A licensed weighmaster shall weigh all Contractor-furnished materials. The Engineer may be present to witness the weighing and to check and compile the daily record of such scale weights. However, in any case, the Engineer will require that the Contractor furnish weight slips and daily summary weigh sheets. In such cases, furnish a duplicate weight slip or a load slip for each vehicle weighed, and deliver the slip to the Engineer at the point of delivery of the material.
 5. If the material is shipped by rail, the certified car weights will be accepted, provided only actual weight of material will be paid for and not minimum car weights used for assessing freight tariff. Car weights will not be acceptable for material to be passed through mixing plants. Material to be measured by weight shall be weighed separately for each bid item under which it is to be paid.
 6. Trucks used to haul material being paid for by weight shall be weighed empty daily and at such additional times as the Engineer may require. Each truck shall bear a plainly legible identification mark. The Engineer may require the weight of the material be verified by weighing empty and loaded trucks on such other scales as the Engineer may designate.
- C. Measurement by Volume:
1. Measurement by volume will be by the cubic dimension indicated in the Contractor's submitted bid. Method of volume measurement will be by the unit volume in place or removed as shown on the Contract Drawings or as specified.
 2. When material is to be measured and paid for on a volume basis and it is impractical to determine the volume by the specified method of measurement, or when requested by the Contractor in writing and accepted by the Engineer in writing, the material may be weighed in accordance with the requirements specified for weight measurement. Such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Resident Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities will be accepted.
- D. Measurement by Area: Measurement by area will be by the square dimension shown on the Contract Drawings or as specified. Method of square measurement will be as specified.
- E. Linear Measurement: Linear measurement will be by the linear dimension listed or indicated in the Contractor's submitted bid. Unless otherwise indicated, items, components, or Work to be measured on a linear basis will be measured at the centerline of the item in place.

F. Field Measurement for Payment:

1. The Contractor shall take all measurements by providing equipment, workers, and survey crews as required to measure quantities in accordance with the provisions for measurement specified herein. No allowance will be made for specified tolerances.
2. The Engineer will verify all quantities of Work performed by the Contractor on a unit-price basis, for progress payment purposes.

1.06 REJECTED, EXCESS, OR WASTED MATERIALS

- A. Quantities of material wasted or disposed of in a manner not called for under the Contract; rejected loads of material, including material rejected after it has been placed by reasons of the failure of the Contractor to conform to the provisions of the Contract; material not unloaded from the transporting vehicle; material placed outside the lines indicated on the Contract Drawings or established by the Engineer; or material remaining on hand after completion of the Work, will not be paid for, and such quantities shall not be included in the final total quantities. No additional compensation will be permitted for loading, hauling, and disposing of rejected material.

1.07 MEASUREMENT AND PAYMENT

A. Item #1: Mobilization and Demobilization

1. Payment for Mobilization and Demobilization shall be for preparatory work and operations performed by the Contractor including, but not limited to, those necessary for the movement of its personnel, equipment, supplies and incidentals to and from the project site; temporary facilities and controls; for the establishment and removal of its offices, buildings and other facilities necessary for work on the project; for other work and operations which it must perform or costs it must incur before beginning production work on the various items on the project site, and for removal of personnel, equipment, supplies, offices, building facilities, sheds, fencing, and other incidentals from the site.
2. Mobilization and Demobilization shall be paid at the lump sum price listed in the Contractor's submitted bid. Incremental payment shall be made for each location as follows:
 - a. 40% after completion of 5% of the total contract amount of other bid items have been earned.
 - b. 40% after completion of 20% of the total contract amount of other bid items have been earned.
 - c. 20% after completion of all work on the project has been completed, including cleanup and acceptance of the project by the Port.

B. Item #2: Project Administration

1. Item Description: The Work of this item includes all administrative costs associated with administering and supervising the project including, but not limited to supervision of personnel, coordination of all work activities, coordination of subcontractors and/or suppliers, preparation and transmittal of submittals, permit acquisitions, for premiums on bonds and insurance for the project, and project overhead.
2. Measurement: This item will be measured based on a percentage complete for the overall lump sum amount.

3. Payment: This item will be paid for at the Contract lump sum price as specified in the Contractor's submitted bid, in accordance with the approved Schedule of Values.
- C. Item #3: Installation of a Prefabricated Metal Building
1. Item Description: The scope of work for this item includes, but is not limited to, providing all labor, materials, and equipment required to design, procure, and install the prefabricated metal building, along with completing all associated mechanical, electrical, and miscellaneous work per the project documents.
 2. Measurement: This item will be measured based on a percentage complete for the overall lump sum amount.
 3. Payment: This item will be paid for at the Contract lump sum price as specified in the Contractor's submitted bid, in accordance with the approved Schedule of Values.
- D. Item #4: Procurement and Installation of Modulares.
1. Item Description: The Work of work for this item includes, but is not limited to, providing all labor, materials, and equipment necessary to design, permit, procure, and install modular buildings; connect the modular buildings to utilities including sawcutting, trenching and asphalt restoration; and perform all other tasks as required by the project documents.
 2. Measurement: his item will be measured based on a percentage complete for the overall lump sum amount.
 3. Payment: This item will be paid for at the Contract lump sum price as specified in the Contractor's submitted bid, in accordance with the approved Schedule of Values.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXEUCION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.02 SUBMITTALS

- A. The Contractor shall submit for approval the following documentation to the Port for force account change orders:
 - 1. List of Labor Rates
 - a. For the Contractor and each subcontractor, a list of labor rates for each trade applicable to the scope of work to be performed. These submitted rates shall be broken down to include the base wage, fringes, FICA, SUTA, FUTA, industrial insurance, and medical aid premiums as stated in the General Conditions. The rates shall not contain any travel time, safety, loss efficiency factors, overhead, or profit. Rates shall be submitted for straight time, overtime, and double time in a form acceptable to the Engineer. Contractor shall provide proof of all labor rate costs as required by the Engineer, including the submission of a copy of the most current Workers Compensation Rate Notice from Labor & Industries and a copy of the Unemployment Insurance Tax Rate notice from the Employment Security Department.
 - 1) If labor rates change during the course of the project or additional labor rates become required to complete the work, the Contractor shall submit new rates for approval.
 - 2. List of Equipment.
 - a. Submit for the Contractor and each subcontractor, a list of equipment and rates applicable to the scope of work to be performed. The equipment rates shall conform to the rates shown on Equipment Watch. A separate page from equipment watch detailing the hourly rate shall be submitted as backup documentation for each piece of equipment.
 - 1) If the list of equipment and/or equipment rates changes during the course of the project or additional equipment becomes required to complete the work, the Contractor shall submit a new list and rates for approval.

1.03 METHOD TO CALCULATE ADJUSTMENTS TO CONTRACT PRICE

- A. One of the following methods shall be used:
 - 1. Unit Price Method;
 - 2. Firm Fixed Price Method (Lump Sum); or,
 - 3. Time and Materials Method (Force Account).
- B. The Port preferred methods are firm fixed price or unit prices.

1.04 MINOR CHANGES IN THE WORK

- A. Engineer will issue a written directive authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.05 PROPOSAL REQUESTS

- A. Port-Initiated Proposal Requests: The Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
1. Work Change Proposal Requests issued by Engineer are not instructions either to stop work in progress or to execute the proposed change.
 2. Contractor shall submit a written proposal within the time specified in the General Conditions. The proposal shall represent the Contractor's offer to perform the requested work, and the pricing set forth within the proposal shall represent full, complete, and final compensation for the proposed change and any impacts to any other Contract Work, including any adjustments in the Contract Time.
 - a. Include a breakdown of the changed work in sufficient detail that permits the Engineer to substantiate the costs.
 - 1) Generally, the cost breakdown should be divided into the time and materials categories listed in the General Conditions under Article 8.02.B for either Lump Sum Proposals or Force Account Proposals.
 - 2) For Unit Price Proposals, include the quantity and description of all work involved in the unit pricing being proposed, along with a not to exceed total cost.
 - b. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or differing site conditions require modifications to the Contract, the Contractor may initiate a claim by submitting a request for a change to the Engineer.
1. Notify the Engineer immediately upon finding differing conditions prior to disturbing the site.
 2. Provide follow-up written notification and differing site conditions proposal within the time frames set forth in the General Conditions.
 3. Provide the differing site condition change proposal in the same or similar manner as described above under 1.05.A.
 4. Comply with requirements in Section 00 26 00 Substitution Procedures if the proposed change requires substitution of one product or system for product or system specified.
 5. Proposal Request Form: Use form acceptable to Engineer.

1.06 PROCEEDING WITH CHANGED WORK

- A. The Engineer may issue a directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order per the General Conditions, Article 8.01.E.
1. The directive will contain a description of change in the Work and a not-to-exceed amount. It will designate the method to be followed to determine the change in the Contract Sum or the Contract Time.

1.07 CHANGE ORDER PROCEDURES

- A. Issuance of Change Order
-

1. On approval of the Contractor's proposal, and following successful negotiations, the Engineer will issue a Change Order for signature by the Contractor and execution by the Engineer.
 - a. The Contractor shall sign and return the Change Order to the Engineer within **four (4) days** following receipt of the Change Order from the Engineer. If the Contractor fails to return the signed Change Order within the allotted time, the Engineer may issue a Unilateral Change Directive.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes specifications for preparation, format, and submittal of Schedule of Values.
- B. The Schedule of Values will establish unit prices for individual items of work.
- C. The Schedule of Values will be the basis for payment of contract work.

1.02 PREPARATION

- A. To facilitate monthly pay requests, develop the Schedule of Values based on the Contractor's submitted Bid Items. The Schedule of Values shall be used to provide an allocation of the Work for measurement and payment to a level of detail to ensure accurate payment for the Work accomplished. The Schedule of Values is based on unit priced bid items and a breakdown of each lump-sum bid item. The total dollars for the Schedule of Values shall total the bid amount.
- B. Obtain the agreement of the Contract Administrator and Engineer on the Schedule of Values. No payment will be made prior to an agreed upon Schedule of Values.
- C. Include an updated version of the Schedule of Values as changes occur. Update the Schedule of Values to include:
 - 1. Dollars earned and percent complete for the current progress payment period,
 - 2. Dollars earned and percent complete to-date, excluding the current progress payment period,
 - 3. Total dollars earned and percent complete to-date,
 - 4. Total dollars remaining, and
 - 5. Changes resulting from Change Orders.
- D. The total value of the line items in the Schedule of Values plus any approved Change Orders shall be equal to the current approved contract price.
- E. The value of stored material shall be identified in the Schedule of Values with both a material-purchase activity and a separate corresponding installation activity in the Construction Schedule(s).
- F. Include as exhibits, drawings or sketches as necessary, to better define the limits of pay items that are in close proximity and that have no clear boundary in the Contract Drawings.

1.03 SUBMITTAL

- A. Submit preliminary Schedule of Values within 10 days of the effective date of the Notice to Proceed.
- B. Submit corrected Schedule of Values within 10 days upon receipt of reviewed Schedule of Values.
- C. At the Contract administrator or Engineer's request, submit documentation substantiating the cost allocations for line items within the Schedule of Values.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 SCHEDULE OF VALUES

- A. Submit the Schedule of Values in a form acceptable to the Contract Administrator and Engineer.
- B. Provide updated Schedule of Values as required by the Contract Administrator or Engineer, and as indicated in the Contract Documents.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE

- A. The purpose of this section is to provide the framework for communication between the Port and the Contractor by defining the types and timing of administrative tasks, including meetings and other items related to communications.

1.02 NOTICE TO PROCEED

- A. Contract execution will be made per the requirements of the Contract Documents. Once the contract has been executed and all pre-work submittals have been received, the Engineer will issue a Notice to Proceed (NTP).
 - 1. In certain instances, the Engineer may issue to the Contractor a Limited NTP for specified elements of the work described in these Contract Documents.
- B. The Contractor shall submit all pre-work submittals within 10 days of contract execution.
 - 1. No contract time extension shall be granted for any delays in issuance of the NTP by the Engineer due to the Contractor's failure to provide acceptable submittals required by the Contract Documents.

1.03 COORDINATION

- A. The Contractor shall coordinate all its activities through the Engineer.
- B. The Contractor shall coordinate construction operations as required to execute the Work efficiently, to obtain the best results where installation of one part of the Work depends on other portions.

1.04 PROJECT MEETINGS

- A. Pre-Construction Meeting
 - 1. After execution of the contract, but prior to commencement of any work at the site, a mandatory one time meeting will be scheduled by the Engineer to discuss and develop a mutual understanding relative to the administration of the safety program, preparation of the Schedule of Values, change orders, RFI's, submittals, scheduling prosecution of the work. Major subcontractors who will engage in the work shall attend.
 - 2. Suggested Agenda: The agenda will include items of significance to the project.
 - 3. Location of the Pre-Construction Meeting will be held at the Port of Tacoma Administration Building located at One Sitcum Plaza or on Microsoft Teams.
- B. Weekly Progress Meetings – Progress meetings include the Contractor, Engineer, consultants and others affected by decisions made.
 - 1. The Engineer will arrange meetings, prepare standard agenda with copies for participants, preside at meetings, record minutes and distribute copies within ten working days to the Contractor, meeting participants, and others affected by decisions made.
 - a. The Engineer will approve submitted meeting minutes in writing within 10 working days.
 - 2. Attendance is required for the Contractor's job superintendent, major subcontractors and suppliers, Engineer, and representatives of the Port as appropriate to the agenda topics for each meeting.

3. Standard Agenda

- a. Review minutes of previous meeting
- b. Review of work progress
- c. Field observations, problems, and decisions
- d. Identification of problems that impede planned progress
- e. Maintenance of Progress Schedule (3 weeks ahead; 1 week back)
- f. Corrective measures to regain projected schedules
- g. Planned progress during succeeding work period
- h. Coordination of projected progress
- i. Maintenance of quality and work standards
- j. Effect of proposed changes on progress schedule and coordination
- k. Demonstration that the project record drawings are up-to-date
- l. Other business relating to the work

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. The Port and Contractor shall use the Port Contract Management application (e-Builder / Trimble Unity Construct®) for electronic information exchange throughout the duration of the Contract, as later described.
 - 1. e-Builder / Trimble Unity Construct® is a web-based application accessed via the web.
 - 2. The Contractor will receive up to two separate user accounts for access to e-Builder / Trimble Unity Construct®.
 - 3. The joint use of this system is to facilitate and coordinate the electronic exchange of Requests for Information, Submittals, Change Order Proposals, and project specific correspondence.

1.02 USER ACCESS LIMITATIONS

- A. Contractor's access to e-Builder / Trimble Unity Construct® is granted and controlled by the Engineer.
 - 1. The users assigned by the Contractor to use e-Builder / Trimble Unity Construct® shall be competent and experienced with the practices commonly employed in the industry for electronically submitting requests for information, submittals, product data, shop drawings and related items as required by the contract and the methods commonly used for project correspondence transmission and filing.
 - 2. Any users assigned by the Contractor whom the Engineer determines is incapable of performing the prescribed tasks in an accurate, competent and efficient manner will be removed upon request from the Engineer. The qualifications and identity of a replacement user shall be submitted within 24 hours for consideration by the Engineer. Once accepted by the Engineer, the user account will be modified accordingly.

1.03 CONTRACTOR TECHNOLOGY REQUIREMENTS

- A. The Contractor is responsible for providing and maintaining web enabled devices capable of running the desktop version of the e-Builder / Trimble Unity Construct® website effectively.

1.04 CONTRACTOR SOFTWARE REQUIREMENTS

- A. The Contractor is responsible for providing and maintaining the following:
 - 1. An office suite that is Microsoft Office 2013 compatible for generation and manipulation of correspondence.
 - 2. A program capable of editing, annotating and manipulating Adobe pdf files for inserting the Contractor's review stamp, clouding and adding notation to the files as necessary for review by the Engineer.

1.05 CONTRACTOR RESPONSIBILITY

- A. Provide all the equipment, internet connections, software, personnel and expertise required to support the use of e-Builder / Trimble Unity Construct® as described in the Contract documents.

1.06 PORT RESPONSIBILITY

- A. Provide the Contractor with the following:

1. All forms necessary for application to obtain permissions to access e-Builder / Trimble Unity Construct® as described above.
2. Information, basic user guides and requirements on methods for using e-Builder / Trimble Unity Construct®.
3. Instruction for the Contractor's staff utilizing e-Builder / Trimble Unity Construct®.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 UTILIZATION OF E-BUILDER / TRIMBLE UNITY CONSTRUCT®

- A. The Contractor shall provide required information in a timely manner that also supports the project schedule and meets the requirements of the Contract.
- B. The Contractor shall provide and maintain competent and qualified personnel to perform the various tasks required to support the work within e-Builder / Trimble Unity Construct®.
- C. The Port will not be liable for any delays associated from the usage of e-Builder / Trimble Unity Construct® including, but not limited to: slow response time, Port maintenance and off-line periods, connectivity problems or loss of information. Under no circumstances shall the usage of e-Builder / Trimble Unity Construct® software be grounds for a time extension or cost adjustment to the contract.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the requirements to provide a preliminary schedule and construction progress schedule, bar chart type.

1.02 SUBMITTALS

- A. Within 10 days following execution of the contract, submit a baseline project schedule defining planned operations.
- B. If the baseline project schedule requires revision after review, submit revised baseline project schedule within 10 days.
- C. Within 20 days after review of baseline project schedule, submit draft of proposed complete baseline project schedule for review.
- D. Submit updated progress schedule monthly to the Engineer with each pay application as required in Section 01 20 00 Price and Payment Procedures.

1.03 QUALITY ASSURANCE

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

1.04 SCHEDULE FORMAT

- A. The baseline project schedule shall be produced using the CPM format.
- B. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- C. Sheet Size: Multiples of 11 x 17 (280 x 432 mm).

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 BASELINE SCHEDULE

- A. Prepare baseline project schedule in the form of a horizontal bar chart.
- B. The baseline project schedule shall include all the activities listed in the Schedule of Values and be directly related to items listed in the Bid Form. The Contractor is encouraged to add sufficient activities to facilitate a clear understanding of the means and methods planned for the various work items.
- C. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction and critical path. At a minimum it shall include and show the following:
 - 1. A time scale showing the elementary work items needed to complete the work;
 - 2. Estimated time durations for each activity, defined as any single identifiable work step within the project;
 - 3. A graphical network diagram showing the logical sequence of activities, their precedence relationships, and estimated float or leeway available for each;

4. The different categories of work as distinguished by crew requirements, equipment requirements, and construction materials; and
 5. The different areas of responsibility, such as distinctly separate or subcontracted work, and identifiable subdivisions of work.
- D. It shall be maintained and updated as necessary to accurately reflect past progress and the most probable future progress.
 - E. Activities shown shall include submittals, milestones, and sufficient task breakdown for major components of work.
 - F. Identify work of separate stages and other logically grouped activities.
 - G. Provide sub-schedules to define critical portions of the entire schedule.
 - H. Provide separate schedule of submittal dates for shop drawings, product data, samples, owner-furnished products, products identified, and dates reviewed submittals will be required from the Engineer. Indicate decision dates for selection of finishes.

3.02 PROGRESS SCHEDULE

- A. From the regularly-maintained baseline project schedule, progress schedules showing a three-week look-ahead, one-week look-back, shall be submitted and distributed at the weekly progress meetings. The progress schedule shall represent a practical plan to complete the work shown within the contract work window presented. At a minimum, the presentation, typically a Gantt-style chart, shall convey the task durations, a logical work sequence, task interdependencies, and identify important or critical constraints.
- B. Submittal and distribution of progress schedules will be understood to be the Contractor's representation that the scheduled work meets the requirements of the contract documents and that the work will be executed in the manner and sequence presented, and over the durations indicated.
- C. The scheduling, coordination, and execution of construction in accordance with the contract documents are the responsibility of the Contractor. The Contractor shall involve, coordinate, and resolve scheduling with all subcontractors, material suppliers, or others affected in development of the progress schedules.
- D. The progress schedule shall be used for coordination purposes for inspection and testing purposes as well as validation of work progress against the baseline schedule.

3.03 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. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- D. Indicate changes required to maintain Date of Substantial Completion.
- E. Submit reports required to support recommended changes.
- F. Contractor shall submit an updated progress schedule with each pay application and include a written narrative describing the overall progress of the work. The narrative shall include the following key aspects:

1. Progress in the last period.
2. Critical Path progress and schedule concerns.
3. Changes to schedule logic or sequencing of the work.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the requirements to provide a submittal log and project submittals.

1.02 SUBMITTAL LOG

- A. Contractor shall, within 14 days of contract execution prepare and submit for Engineer approval a detailed log of all the submittals required under this Contract, along with any other submittals identified by the Port or Contractor. The log shall include, but not be limited to, schedules, required construction Work plans, equipment and material cut sheets, shop drawings, project record documents, test results, survey records, record drawings, results of QC testing, and all other items for which a submittal is required. The submittal log shall be organized by CSI Specification Division, and Section number and include the following information:
 - 1. Item Description
 - 2. Category
 - 3. Specification Section information of the applicable section
 - 4. After the submittal log is reviewed and approved by the Engineer, it shall become the basis for the submittal of all items by Contractor.

1.03 COMPLIANCE

- A. Failure to comply with these requirements shall be deemed as the Contractor's agreement to furnish the exact materials specified or materials selected by the Engineer based on these specifications.

1.04 SHOP DRAWINGS AND MANUFACTURERS' LITERATURE

- A. The Port will not accept shop drawings that prohibit the Port from making copies for its own use.
- B. Shop drawings shall be prepared accurately and to a scale sufficiently large to indicate all pertinent features of the products and the method of fabrication, connection, erection, or assembly with respect to the Work.
- C. All drawings submitted to the Engineer for approval shall be drawn to scale as ANSI D.
- D. Required electronic formats for these drawings are as follows:
 - 1. AutoCad DWG
 - 2. PDF - Formatted to print to half-scale using 11x17 paper
- E. Catalog cuts or brochures shall show the type, size, ratings, style, color, manufacturer, and catalog number of each item and be complete enough to provide for positive and rapid identification in the field. General catalogs or partial lists will not be accepted. Manufacturers' original electronic files are required for submitting.

1.05 SUBMITTAL REVIEW

- A. After review of each of Contractor's submittals, the submittal will be returned to Contractor with a form indicating one or more of the following:

1. No Exceptions Taken - Means, accepted subject to its compatibility with future submittals and additional partial submittals for portions of the work not covered in this submittal. But it does not constitute approval or deletion of specified or required items not shown in the partial submittal.
 2. Make Corrections Noted - Same as Item 1, except that minor corrections as noted shall be made by Contractor.
 3. Reviewed - Submittal has been reviewed by the Port, does not constitute approval, and the Contractor is responsible for requirements in submittal.
 4. Review as Noted - Submittal has to be reviewed by the Port with comments as noted.
 5. Revise and Resubmit - Means, rejected because of major inconsistencies or errors. Resolve or correct before next submittal.
 6. Rejected - Means, submitted material does not conform to the Contract Documents in a major respect (e.g., wrong material, size, capacity, model, etc.).
- B. Submittals marked "No Exceptions Taken," "Make Corrections Noted," or "Reviewed as Noted" authorizes Contractor to proceed with construction covered by those data sheets or shop drawings with corrections, if any, incorporated.
- C. When submittals or prints of shop drawings have been marked "Revise and Resubmit" or "Rejected," Contractor shall make the necessary corrections and submit required copies. Every revision shall be shown by number, date, and subject in a revision block, and each revised shop drawing shall have its latest revision numbers and items clearly indicated by clouding around the revised areas on the shop drawing.
- D. Submittals authorized by the Engineer do not in any case supersede the Contract Documents. The approval by the Engineer shall not relieve the Contractor from responsibility to conform to the Drawings or Specifications, or correct details when in error, or ensure the proper fit of parts when installed. A favorable review by the Port of shop drawings, method of work, or information regarding material and equipment Contractor proposes to furnish shall not relieve Contractor of its responsibility for errors therein and shall not be regarded as assumption of risk or liability by the Port or its officers, employees, or representatives. Contractor shall have no claim under the Contract on account of failure or partial failure, or inefficiency or insufficiency of any plan or method of work, or material and equipment so accepted. Favorable review means that the Port has no objection to Contractor using, upon its own full responsibility, the plan or method of work proposed, or furnishing the material and equipment proposed.
- E. It is considered reasonable that the Contractor's submittals shall be complete and acceptable by at least the second submission of each submittal. The Port reserves the right to deduct monies from payments due Contractor to cover additional costs for review beyond the second submission.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 PREPARATION OF SUBMITTALS

- A. The Contractor shall submit all shop drawings, catalog cuts, brochures and physical samples using Trinity Unity Connect (a web based construction management software). All post-document-generated notations such as notes, arrows, stamps, clouding, or other items, are required to be shown directly on the submittal document. **Each submittal shall be accompanied by a transmittal developed within the Trinity Unity Connect software.**

- B. A separate submittal shall be prepared for each product or procedure and shall be further identified by referencing the Specification Section and paragraph number and each submittal shall be numbered consecutively.
- C. Product submittals that cannot be accomplished electronically shall be submitted electronically without attachments, marked as being hand delivered, and accompanied by a printed version of a transmittal.
- D. Shop and detail drawings shall be submitted in related packages. All equipment or material details which are interdependent, or are related in any way, must be submitted indicating the complete installation. Submittals shall not be altered once marked "No Exceptions Taken" Revisions shall be clearly marked and dated. Major revisions must be submitted for approval.
- E. The Contractor shall thoroughly review all shop and detail drawings, prior to submittal, to assure coordination with other parts of the work.
- F. Components or materials which require shop drawings and which arrive at the job site prior to approval of shop drawings shall be considered as not being made for this project and shall be subject to rejection and removal from the premises.
- G. All submittal packages including, but not limited to, product data sheets, mix designs, shop drawings and other required information for submittal must be submitted, reviewed and approved before the relevant scheduled task may commence. It is the responsibility of the Contractor to provide the submittal information which may drive a task on the construction schedule to submit items well enough in advance as to provide adequate time for review and comment from the Engineer without adversely impacting the construction schedule.
- H. When completing the Trinity Unity Connect submittal form, a Date Due field is required to be completed. This field is intended to inform the Port of the urgency of the submittal. Failure of the Port to return the submittal by the date provided by the Contractor will not be considered grounds for a contract time extension.

3.02 PRE-WORK SUBMITTALS

- A. Prior to issuance of Notice to Proceed, the following submittals must be submitted and returned to the Contractor as No Exceptions Taken, Make Corrections Noted, Reviewed, or Reviewed as Noted.
 - 1. Per 00 72 00 and 01 32 16, Baseline Project Schedule
 - 2. Per 00 73 63, Emergency Contact Numbers
 - 3. Per 01 35 29, Health and Safety Plan (HASP)
 - 4. Per 01 35 29, Spill Prevention and Countermeasures Plan (SPCC)
 - 5. Per 01 35 47, List of equipment and written certification

3.03 MAINTENANCE OF SUBMITTAL LOG

- A. Prepare and submit for Port review a detailed submittal log conforming to the requirements of paragraph 1.02 of this section. When approved by the Engineer, use the submittal log to track the transmittal of submittals to the Engineer, the receipt of submittal comments from the Engineer, and all subsequent action with respect to each submittal. Provide an updated copy of the submittal log to the Engineer during each weekly progress meeting, unless otherwise approved by the Engineer.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. The work includes the requirements for health and safety provisions necessary for all work at the site for this project. The work also includes compliance with all laws, regulations and ordinances with respect to safety, noise, dust, fire and police action, civil disobedience, security or traffic.
- B. The Contractor shall monitor site conditions for indications of identified and other potentially hazardous, dangerous, and/or regulated materials (suspicious material). Indicators of suspicious material include, but are not limited to, refuse, oily sheen or coloring on soil or water, or oily or chemical odors. If suspicious materials are encountered, the Contractor shall stop all work in that area and notify the Engineer immediately.

1.02 SUBMITTALS

- A. Prior to Notice to Proceed, the Contractor shall provide a site specific Health and Safety Plan (HASP), which meets all the requirements of local, state and federal laws, rules and regulations. The HASP shall address all requirements for general health and safety and shall include, but not be limited to:
 - 1. Description of work to be performed and anticipated chemical and/or physical hazards associated with the work;
 - 2. Map of the site(s) illustrating the location of the anticipated hazards and areas of control for those hazards (including containments, exclusion/work zones, and contaminant reduction/decontamination zones);
 - 3. Hazardous material inventory and safety data sheets (SDSs) for all chemicals which will be brought on site;
 - 4. Signage appropriate to warn site personnel and visitors of anticipated site hazards;
 - 5. Documentation that the necessary workers have completed the required Hazardous Waste Operations and Emergency Response (HAZWOPER) training;
 - 6. Engineering controls/equipment to be used to protect against anticipated hazards;
 - 7. Personal protective equipment and clothing including head, foot, skin, eye, and respiratory protection;
 - 8. Procedures which will be used for:
 - a. Lockout/Tagout,
 - b. Fall protection,
 - c. Trenching and shoring,
 - d. Hot work,
 - e. Explosive conditions due to methane,
 - f. Oxygen deficient conditions,
 - g. Asbestos and lead hazards,
 - h. Suspicious materials and/or unidentified materials,

- i. Confined-space entry (could include dewatering storage tanks, manholes, or other items),
 - j. Confined-space rescue, and
 - k. Odorous conditions and toxic gases;
9. Exposure monitoring to be used to evaluate actual hazards compared with anticipated conditions, including but not limited to arsenic exposure assessment;
 10. Site housekeeping procedures and personal hygiene practices;
 11. Personnel and equipment decontamination plan;
 12. Railroad safety procedures;
 13. Administrative controls;
 14. Emergency plan including locations of and route to nearest hospital;
 15. Medical surveillance program for site personnel before, during, and after completion of site work;
 16. Recordkeeping including:
 - a. Documentation of appropriate employee training (e.g., Hazardous Waste Operations and Emergency Response [HAZWOPER] 40-hour training for staff involved with excavation and handling of soil),
 - b. Respirator fit testing, and
 - c. Arsenic exposure assessment results;
 17. Name and qualification of person preparing the HASP and person designated to implement and enforce the HASP;
 18. Name and qualifications for Certified Safety Professional (CSP) or Certified Industrial Hygienist (CIH) and a copy of the CIH's or CSP's certification and resume;
 19. Excavation, stockpiling, and truck loading procedures;
 20. Lighting and sanitation; and
 21. Signatory page for site personnel to acknowledge receipt, understanding, and agreement to comply with the HASP.
- B. Prior to the start of any Work, the Contractor shall provide a site specific Spill Prevention, Control and Countermeasures (SPCC) Plan, which meets all the requirements of local, state and federal laws, rules and regulations.
- C. Contractor may submit the HASP and SPCC Plan as one comprehensive document or may submit the plans as separate documents.

1.03 POTENTIAL CHEMICAL HAZARDS

- A. Site Contaminants

1. The Contractor must provide site workers with Hazard Communication standard information for potential site contaminants (in accordance with WAC 296-843). The Contractor shall ensure that all site workers are aware of and understand this information. Additional information shall also be provided by the Contractor, as necessary, to meet the Hazard Communication Standard and HASP requirements as noted in WAC 296-901-14010 and 296-843. Workers shall be instructed on basic methods or techniques to assist in detecting suspicious material.

B. Potential Exposures Routes

1. Inhalation: Airborne dusts, fibers, particulates, or vapors may be released during site activities. Inhalation of airborne inorganic arsenic may occur.
2. Skin and Eye Contact: Dusts generated during site work activities may settle on the skin or clothing of site workers. Also, workers may contact potentially regulated sediments, or water, in the normal course of their work. Precautions to prevent skin or eye contact with hazardous materials will be included in the HASP. Arsenic exposure may cause skin irritation.
3. Ingestion: Inadvertent transfer of site contaminants from hands or other objects to the mouth could occur if site workers eat, drink, smoke, chew tobacco, or engage in similar activities in work areas. This could result in ingestion of site contaminants. Precautions to prevent accidental or inadvertent ingestion of hazardous materials will be included in the HASP.

- C. Chemical hazards may also result from Contractor operations resulting in inadvertent release of fuel, oil, or other chemicals in a manner that would expose workers.

1.04 POTENTIAL PHYSICAL AND OTHER HAZARDS

- A. Specific aspects of construction resulting in physical hazards anticipated for this project include, but are not limited to the following:

1. Major hazards associated with earthwork impacts from moving construction vehicles and trucks, noise, thermal stress, contact with unguarded machines, excavation hazards (i.e., cave-in, utility, etc.), strains from heavy lifting, and reduced visibility and communications difficulties in work area; and
2. Operation of equipment, including excavators, loaders, and related equipment, presenting hazards of entrapment, ensnarement, and being struck by moving parts.

B. Other anticipated physical hazards:

1. Heat stress, such as that potentially caused by impermeable clothing (may reduce the cooling ability of the body due to evaporation reduction);
2. Cold stress, such as that potentially caused during times when temperatures are low, winds are high, especially when precipitation occurs during these conditions;
3. Biological hazards, such as mold, insect stings, or bites, poisonous plants (i.e., poison oak, sumac, etc.); and
4. Trips and falls.

C. Firewatch Procedures

1. A firewatch is implemented to ensure the fire-safety of a building, structure or area in the event of any act (e.g., hot work) or situation instigating an increased risk of fire. The term "firewatch" is used to describe a dedicated person or persons whose sole responsibility is to look for fires within an established area.
2. A firewatch is required when all hot work is being performed.
3. The firewatch is to perform the following functions:
 - a. Firewatch personnel are to keep diligent watch for fires in the general area where the work is being performed.
 - b. Firewatch personnel are to be familiar with facilities and procedures for sounding an alarm in the event of a fire.
 - c. Firewatch personnel are to have fire extinguishing equipment readily available and be trained in its use, including practice on test fires.
 - d. Firewatch personnel are to inspect the site prior to hot work activities to ensure that combustibles are removed or covered and that any nearby holes or penetrations in the ground and walls are sealed or covered with fire-safe materials.
 - e. Firewatch personnel are to watch for fires in all exposed areas. If a fire is located, firewatch personnel are to sound the evacuation alarm immediately and after that try to extinguish the fire, only when obviously within the capacity of the equipment available.
 - f. The firewatch is to be maintained for at least 120 minutes after completion of hot work such as cutting, welding, or other open flame operations, in order to detect and extinguish smoldering and flaming fires. During this time, the work area and other adjacent areas where sparks or flame may have traveled are to be searched for signs of combustion.

PART 2 - PRODUCTS

2.01 SAFETY SIGNAGE

- A. The Contractor shall provide signage at strategic locations within the project site to alert jobsite workers and visitors of the remediation work, associated hazards, and required precautions.

2.02 PRODUCTS SPECIFIED FOR HEALTH AND SAFETY

- A. Provide the equipment and supplies necessary to support the work as described in the site-specific HASP. Equipment and supplies may include, but are not limited to:
 1. All chemicals to be used on site;
 2. A hazardous materials inventory and SDSs for the chemicals brought on site;
 3. Fencing and barriers;
 4. Warning signs and labels;
 5. Trenching equipment;
 6. Fire extinguishers;
 7. Equipment to support hot work;
 8. Equipment to support lockout/tagout procedures;
 9. Scaffolding and fall protection equipment;

10. Personal protective equipment (hard hats, foot gear, skin, eye, and respiratory protection);
11. Area and personnel exposure monitoring equipment;
12. Demolition equipment and supplies;
13. Decontamination equipment and supplies;
14. First aid equipment;
15. Spill response and spill prevention equipment; and
16. Field documentation logs/supplies.

PART 3 - EXECUTION

3.01 WORK AREA PREPARATION

- A. Contractor shall comply with health and safety rules, regulations, ordinances promulgated by the local, state, and federal government, the various construction permits, and other sections of the Contract Documents. Such compliance shall include, but not be specifically limited to: any and all protective devices, equipment and clothing; guards; restraints; locks; latches; switches; and other safety provisions that may be required or necessitated by state and federal safety regulations. The Contractor shall determine the specific requirements for safety provisions and shall have inspections and reports by the appropriate safety authorities to be conducted to ensure compliance with the intent of the regulations.
- B. Contractor shall inform employees, subcontractors and their employees of the potential danger in working with any potentially regulated materials, equipment, soils and groundwater at the project site.
 1. The Contractor shall not proceed with jobsite activities that might result in exposure of employees to hazardous materials, including arsenic, until the HASP is reviewed by the Engineer.
- C. All Contractor employees expected to work at the jobsite or individuals entering the jobsite shall read the Contractor HASP before they enter the jobsite, and will sign a statement provided by the Contractor that they have read and understand the HASP. A copy of the Contractor's HASP shall be readily available at the site at all times the work is being performed.
- D. The Contractor's HASP shall be amended as needed by the CIH or CSP to include special work practices warranted by jobsite conditions actually encountered. Special practices could include provisions for decontamination of personnel and equipment, and the use of special equipment not covered in the initial plan.
- E. Contractor shall perform whatever work is necessary for safety and be solely and completely responsible for conditions of the job site, including safety of all persons (including employees of the Engineer, Engineer's Representative, and Contractor) and property during the Contract period. This requirement applies continuously and is not limited to normal working hours.
- F. The Engineer's review of the Contractor's performance does not include an opinion regarding the adequacy of, or approval of, the Contractor's safety supervisor, the site-specific HASP, safety program or safety measures taken in, on, or near the job site.

- G. Accidents causing death, injury, or damage must be reported immediately to the Engineer and the Port Security Department in person or by telephone or messenger. In addition, promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses.
- H. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing within 24 hours after occurrence, to the Engineer, giving full details of the claim.

3.02 SITE SAFETY AND HEALTH OFFICER

- A. Contractor shall provide a person designated as the Site Safety and Health Officer, who is thoroughly trained in rescue procedures, has a minimum current 40-hour HAZWOPER certification (minimum), and trained to use all necessary safety equipment, air monitoring equipment, and gas detectors. The person must be available and/or present at all times while work is being performed, and conduct testing, as necessary.
- B. The Site Safety and Health Officer shall be empowered with the delegated authority to order any person or worker on the project site to follow the safety rules. Failure to observe these rules is sufficient cause for removal of the person or worker(s) from this project.
- C. The Site Safety and Health Officer is responsible for determining the extent to which any safety equipment must be utilized, depending on conditions encountered at the site.

3.03 SPILL PREVENTION AND CONTROL

- A. The Contractor shall be responsible for prevention, containment and cleanup of spilling petroleum and other chemicals/hazardous materials used in the Contractor's operations. All such prevention, containment and cleanup costs shall be borne by the Contractor.
- B. The Contractor is advised that discharge of oil, fuel, other petroleum, or any chemicals/hazardous materials from equipment or facilities into state waters or onto adjacent land is not permitted under state water quality regulations.
- C. In the event of a discharge of oil, fuel or chemicals/hazardous materials into waters, or onto land with a potential for entry into waters, containment and cleanup efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup shall include proper disposal of all spilled material and used cleanup materials.
- D. The Contractor shall, at a minimum, take the following measures regarding spill prevention, containment and cleanup:
 - 1. Fuel hoses, lubrication equipment, hydraulically operated equipment, oil drums and other equipment and facilities shall be inspected regularly for drips, leaks or signs of damage, and shall be maintained and stored properly to prevent spills. Proper security shall be maintained to discourage vandalism.
 - 2. All land-based chemical, oil and products' storage tanks shall be diked, contained and/or located so as to prevent spills from escaping into the water. Dikes and containment area surfaces shall be lined with impervious material to prevent chemicals or oil from seeping through the ground and dikes.

3. All visible floating sheen shall be immediately contained with booms, dikes or other appropriate means and removed from the water prior to discharge into state waters. All visible spills on land shall be immediately contained using dikes, straw bales or other appropriate means and removed using sand, sawdust or other absorbent material, which shall be properly disposed of by the Contractor. Waste materials shall be temporarily stored in drums or other leak-proof containers after cleanup and during transport to disposal. Waste materials shall be disposed offsite in accordance with applicable local, state and federal regulations.
 4. In the event of any oil or product discharges into public waters, or onto land with a potential for entry into public waters, the Contractor shall immediately notify the Port Security at their listed 24-hour response number:
 - a. Port Security: 253-383-9472
- E. The Contractor shall maintain the following materials (as a minimum) at each of the project sites:
1. Oil-absorbent booms: 100 feet;
 2. Oil-absorbent pads or bulk material, adequate for coverage of 200 square feet of surface area;
 3. Oil-skimming system; and
 4. Oil dry-all, gloves, and plastic bags.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section discloses procedures to follow if unknown regulated materials are encountered.

1.02 NOTIFICATION AND SUSPENSION

- A. In the event the Contractor detects the presence of potentially regulated materials not previously identified in this specification, the Contractor shall stop work and immediately notify the Port. Following such notification by the Contractor, the Port shall in turn notify the various governmental and regulatory agencies concerned with the presence of regulated materials, if warranted. Depending upon the type of materials identified, the Port may suspend work in the vicinity of the discovery under the provisions of General Conditions.
 - 1. Following completion of any further testing necessary to determine the nature of the materials involved, the Port will determine how the material shall be managed. Although the actual procedures used in resuming the work shall depend upon the nature and extent of the regulated material, the following alternate methods of operation are foreseen as possible:
 - a. Contractor to resume work as before the suspension.
 - b. Contractor to move its operations to another portion of the work until measures to eliminate any hazardous conditions can be developed and approved by the appropriate regulatory agencies.
 - c. The Port to direct the Contractor to dispose or treat the material in an approved manner.
 - d. The Port to terminate or modify the Contract accordingly, for unforeseen conditions.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Soils that cannot be reused onsite and are anticipated to be exported to an off-site facility must have a completed soil profile prior to export. The Port will conduct testing of material as defined further in this specification. The Contractor is responsible for any additional testing necessary to satisfy requirements of the Contractor's receiving facility.
- B. Soils excavated within the project area, as shown on the drawings, are anticipated to be free of regulated material; however, should the Contractor identify soil that cannot be reused as part of the project, the Contractor shall notify the Engineer to determine if the soil requires special handling.
 - 1. Soil with unexpected regulated material, as identified by visual and/or olfactory methods, shall be segregated from other excavated material until such time as appropriate testing and analysis can be completed by the Port. Upon completion of the soil profile, the Engineer will inform the Contractor of any special handling requirements based on the results.
 - 2. Soil beyond construction excavation limits will not require excavation unless free draining product is observed or other special conditions exist; in which case the Engineer will direct the Contractor in additional excavation. Soils determined to require special handling will be hauled and disposed of at an approved disposal facility.
- C. No soil shall be removed from the site without prior notification to the Engineer. The notification shall include:
 - 1. An estimate of the number of truck-trips, the haul destination, and the period in which these trips will be made (e.g., 20 truck-trips to the Waste Management Facility over the two-week period beginning on March 1, 2012).

1.02 DEFINITIONS

- A. Olfactory Indications (methods): Of or relating to the sense of smell. Soils containing petroleum and other volatile constituents typically exhibit characteristic odors that can be detected (and sometimes identified) by smell.
- B. Regulated Material: Any chemical, physical, biological, or radiological substance that does not occur naturally in the environment, or that occurs at concentrations higher than natural background levels, and is regulated by agencies as to the disposal/recycling facility(ies) the material can and cannot go (i.e., EPA, Department of Ecology, Tacoma-Pierce County Health Department).
- C. Soil (waste) Profile: A characterization of the chemical and physical properties of soil material designated for off-site disposal, including the presence of pollutants and their concentrations as measured by approved laboratory analytical methods. A profile is required by the receiving permitted disposal or recycling facility.
- D. Special Handling: Refers to hauling and disposal of soils that cannot be reused in place as backfill or as general fill at another (off-site) location due to the presence of pollutants in concentrations above allowable limits. Such soils must be hauled to and managed at a permitted disposal facility.

- E. Type A Regulated Soil: Soil that must be removed from the Project site and has been determined by the Engineer to contain pollutants in concentrations that exceed state or federal dangerous or hazardous designations (respectively), or other special Port-determined criteria. Type A Regulated Soil requires disposal at an approved Subtitle C hazardous waste landfill.
- F. Type B Regulated Soil: Soil that must be removed from the Project site and has been determined by the Engineer to contain pollutants in concentrations that are below dangerous or hazardous levels, but could negatively impact the quality of air, waters of the state, soils or sediments, or pose a threat to the health of humans or other living organisms, depending on where the soil is disposed. Type B Regulated Soil requires disposal an approved Subtitle D solid waste landfill.
- G. Type C Regulated Soil: Soil that must be removed from the Project site and has been determined by Engineer to contain unknown constituent(s) and/or in unknown concentration(s) and requires further analysis and characterization. Type C Regulated soil will require disposal at an approved Subtitle C hazardous waste landfill or Subtitle D solid waste landfill if additional soil characterization indicates special handling is required.
- H. Type D Soil: Soil determined by the Engineer not to require special handling with regard to this Contract. Classification of material as Type D Soil by the Port is not a certification nor does it release the Contractor of liability or obligation to meet any disposal or storage facility acceptance or testing requirements.
- I. Unexpected Regulated Material: Regulated material unexpectedly found in an excavation or in other locations where there is no prior knowledge, information, or history to indicate possible spills or releases of regulated material.
- J. Visual Indications (methods): A preliminary evaluation of the potential presence of contamination based on visual observation. For example, soils containing petroleum are frequently discolored or stained relative to non-petroleum impacted native soils or clean fill.

1.03 HEALTH AND SAFETY

- A. The Contractor is required to implement all health and safety provisions as required by Specification 01 35 29 – Health, Safety and Emergency Response. These provisions include any special monitoring, personal protective equipment, or work plans to accommodate regulated soil or material special handling. Use of environmental characterization data may not be appropriate for health and safety purposes.

1.04 SUBMITTALS

- A. Prior to excavation of any subsurface materials, the Contractor shall submit a Soils Management Plan to the Engineer. The Soils Management Plan must be approved by the Engineer prior to any excavation of subsurface materials. The Soils Management Plan must include the following:
 - 1. Identification of all soil disposal facilities anticipated to be used for soils that are determined to be Type A or Type B Regulated Soil.
 - 2. Identification of all fill sites, disposal/recycling facilities and/or end uses anticipated to be used for soil determined to be Type D Soil in accordance with paragraph 3.02 of this section.
 - 3. Contingency for delivery and placement of Type C Regulated Soil at an on-site soil stockpile area.

4. Contingency for managing soil/debris encountered during excavation that may disqualify soil for disposal or recycle at the anticipated facilities.
5. General description of how equipment operators, safety staff and other applicable on-site personnel will identify and respond to soil containing potentially regulated material.
6. Contractor shall coordinate with the Engineer to facilitate handling of regulated soil in accordance with this specification.
7. Description of all haul routes to be used on the project.

B. A completed soil profile prior to export to an off-site receiving facility.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 EXCAVATION/TESTING

- A. The field-testing for soil to be exported offsite will be performed by the Port and will result in the following classification of material:
 1. Type A Regulated Soil as defined in 1.02(E) of this Section
 2. Type B Regulated Soil as defined in 1.02(F) of this Section
 3. Type C Regulated Soil as defined in 1.02(G) of this Section
 4. Type D Soil as defined in 1.02(H) of this Section
- B. Contractor shall give Port no less than one week notice for sampling export soil prior to disposal offsite. Contractor shall anticipate at least two weeks for lab results.
- C. Laboratory turnaround times may require additional time for analytical results; therefore, Contractor should coordinate with Engineer well in advance of anticipated disposal date. Samples that are required to have "rush" analysis performed due to the Contractor's failure to disclose the anticipated disposal date shall have the difference in service fees paid by the Contractor, or the Contractor may delay the disposal until the standard analysis turnaround time is complete, at no additional cost to the Port.

3.02 TRANSPORTATION AND OFF-SITE DISPOSAL OF SOILS

- A. The Contractor shall be responsible for handling, re-handling, loading, transporting, and legal off-site removal of all waste materials and excavated soils not reused onsite.
 1. Contractor shall ensure that transport truck gross weight meets federal and/or state Department of Transportation (DOT) requirements and the requirements of the receiving facility, whichever is more stringent.
 2. Contractor shall take measures to prevent debris from being spilled from trucks or tracked from the site to local streets. Contractor shall sweep streets adjacent to the site as necessary or as directed by the Engineer.
 3. Contractor shall ensure that any vehicle transporting materials offsite are properly labeled and placarded in accordance with federal and state DOT requirements.
- B. Type A Regulated and Type B Regulated Soil shall be hauled to an approved facility by the Contractor for disposal.

- C. Type C Regulated Soil is of unknown origin or special circumstances. Type C Regulated Soil shall be hauled to an on-site segregated stockpile area. The Contractor shall protect the material from weather and other disturbances once stockpiled. The Port will inform the Contractor of the soil profile following additional analysis of the suspect material (as needed), and the soil will be categorized as either Type A Regulated, Type B Regulated or Type D Soil and disposed of accordingly.
- D. Type D Soil that is not reused onsite shall be hauled by the Contractor to a site determined by the Contractor. If the receiving/disposal facility requires additional testing or certification of this soil, Contractor shall complete these requirements, at no additional cost to the Port. The Port will not certify or declare the material suitable for unrestricted use.

3.03 OTHER REQUIREMENTS

- A. Type A, Type B or Type C Regulated Soil may be, upon approval of the Engineer, temporarily stockpiled within the construction area. Contractor shall place an impervious liner beneath the soil and securely cover the stockpile with waterproof covering (e.g., plastic sheeting). Additional measures (e.g., berm, jersey barriers, silt fence, etc.) may be required to minimize soil runoff from the stockpile area. The soil shall be removed prior to completion of Work.
- B. Contractor shall provide the Engineer with all hauling receipts (or copies of receipts) from the disposal facility for all Type A, Type B or Type C Regulated Soil at least weekly.
- C. The Engineer may shut down excavation activities should unexpected regulated material be encountered during excavation.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. The Work includes the requirements to provide air and noise control measures until Final Completion of the Work.

1.02 SUBMITTALS

- A. Prior to Notice to Proceed, the Contractor shall submit a list of equipment to be used on the project and written certification that all equipment on the list and any additional equipment, including Contractor's, subcontractors or supplier's equipment, shall meet the requirements of 3.01 below.

PART 2 - PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 AIR POLLUTION CONTROL

- A. The Contractor shall meet or exceed EPA Tier 2 off-road diesel engine emission standards for off-road equipment \geq 25hp and meet or exceed EPA 1994 on-road diesel engine emission standards for on-road equipment except as follows:
 - 1. Equipment being used in an emergency or public safety capacity
- B. The Contractor shall not discharge smoke, dust, and other hazardous materials into the atmosphere that violate local, state or federal regulations.
- C. No vehicles can idle for more than 5 consecutive minutes, except as follows:
 - 1. Idling is required to bring or maintain the equipment to operating temperature;
 - 2. Engine idling is necessary to accomplish work for which the equipment was designed (i.e. operating a crane); or
 - 3. Idling vehicles being used in an emergency or public safety capacity.
- D. The Contractor shall minimize nuisance dust by cleaning, sweeping, vacuum sweeping, sprinkling with water, or other means. Equipment for this operation shall be on the job site or available at all times.

3.02 NOISE CONTROL

- A. The Contractor shall comply with all local controls and noise level rules, regulations and ordinances which apply to work performed pursuant to the Contract.
- B. All internal combustion engines used on the job shall be equipped with a muffler of a type recommended by the manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 PERMITS, CODES, AND REGULATIONS

- A. The following permits/approvals have been applied for (or are on file) and incorporated into the Contract:
 - 1. Prefabricated Metal Building Permit No. BLDCN25-0026, Appendix A.
 - 2. Silverback Modular Building Permit No. To be applied for with contractor, Appendix B.
 - 3. Motive Modular Building Permit No. To be applied for with contractor, Appendix C.
 - 4. Restroom Modular Building permit No. To be applied for with contractor, Appendix D,
 - 5. Site Development Permit No. SDEV25-0024, FRC25-0251, Appendix E.
 - 6. Fence Building Permit No. BLDCA25-0368, Appendix F.
- B. Conform with the requirements of listed permits and additional or other applicable permits, codes, and regulations as may govern the Work.
- C. Obtain and pay fees for licenses, permits, inspections, and approvals required by laws ordinances, and rules of appropriate governing or approving agencies necessary for proper completion of Work (other than those listed under item 1.01.A above and Special Inspections called for by the International Building Code).
- D. Conform with current applicable codes, regulations and standards, which is the minimum standard of quality for material and workmanship. Provide labor, materials, and equipment necessary for compliance with code requirements or interpretations, although not specifically detailed in Drawings or specifications. Be familiar with applicable codes and standards prior to bidding.
- E. Process through Engineer, request to extend, modify, revise, or renew any of the permits (listed in 1.01.A above). Furnish requests in writing and include a narrative description and adequate Drawings to clearly describe and depict proposed action. Do not contact regulatory agency with requests for permit extensions, modifications, revisions, or renewals without the prior written consent of the Engineer.

1.02 VARIATIONS WITH CODES, REGULATIONS AND STANDARDS

- A. Nothing in the Drawings and specifications permits Work not conforming to codes, permits, or regulations. Promptly submit written notice to the Engineer of observed variations or discrepancies between the Contract Documents and governing codes and regulations.
- B. Appropriate modifications to the Contract Documents will be made by Change Order to incorporate changes to Work resulting from code and/or regulatory requirements. Contractor assumes responsibility for Work contrary to such requirements if Work proceeds without notice.
- C. Contractor is not relieved from complying with requirements of Contract Documents which may exceed, but not conflict with requirements of governing codes.

1.03 COORDINATION WITH REGULATORY AGENCIES

- A. Coordinate Work with appropriate governing or regulating authorities and agencies.
- B. Provide advance notification to proper officials of Project schedule and schedule revisions throughout Project duration, in order to allow proper scheduling of inspection visits at proper stages of Work completion.

- C. Regulation coordination is in addition to inspections conducted by Engineer. Notify Engineer at least 48 hours in advance of scheduled inspections involving outside regulating officials, to allow Engineer to be present for inspections.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes requirements relating to referenced standards.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Should specified reference standards conflict with Contract Documents, request clarification from the Engineer before proceeding.
- D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 QUALITY CONTROL FOR COMPLIANCE:

- A. The Contractor shall perform such detailed examination, inspection, quality control and assurance of the Work as to ensure that the Work is progressing and is being completed in strict accordance with the Contract Documents. The Contractor shall plan and lay out all Work in advance of operations so as to coordinate all Work without delay or revision. The Contractor shall be responsible for inspection of portions of the Work already performed to determine that such portions are in proper condition to receive subsequent Work. Under no conditions shall a portion of Work proceed prior to preparatory work having been satisfactorily completed. The Contractor shall ensure that the responsible Subcontractor has carefully examined all preparatory work and has notified the Contractor (who shall promptly notify the Port in writing) of any defects or imperfections in preparatory work that will, in any way, affect completion of the Work.

1.02 QUALITY ASSURANCE - 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 Engineer 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. Perform Work 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, or disfigurement.

1.03 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 Engineer before proceeding.
- C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.04 TESTING SERVICES

- A. 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.
 - 1. Neither observations by an inspector retained by the Port, the presence or absence of such inspector at the site, nor inspections, tests, or approvals by others, shall relieve the Contractor from any requirement of the Contract Documents, nor is any such inspector authorized to change any term or condition of the Contract Documents.

- B. Necessary materials testing shall be performed by an independent testing laboratory during the execution of the Work and paid for by the Port of Tacoma, unless otherwise specified. Access to the area necessary to perform the testing and/or to secure the material for testing, shall be provided by the Contractor.
- C. Testing does not relieve Contractor from performing work to contract requirements.
- D. Re-testing required because of non-conformance to specified requirements will be charged to the Contractor by deducting testing charges from the Contract Sum via Change Order.
- E. Material testing for initial material approval will be performed by an independent, certified laboratory and paid for by the Contractor. These tests must be dated within six (6) months of the submittal date.
- F. Subsequent sampling and testing, required as the work progresses to ensure continual control of materials and compliance with all requirements of the Contract documents, shall be the responsibility of the Port, except as required by other sections of these Specifications.

1.05 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up equipment, test, and adjust and balance equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes requirements relating to the following:
 - 1. Temporary utilities,
 - 2. Temporary telecommunications services,
 - 3. Temporary sanitary facilities,
 - 4. Temporary Controls: Barriers, enclosures, and fencing.

1.02 TEMPORARY UTILITIES

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes. Contractor is responsible for getting required permits and meters from the City of Tacoma.
- B. Existing facilities not to be used.
- C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.03 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.
- C. At end of construction, return facilities to same or better condition as originally found.

1.04 BARRIERS

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

1.05 FENCING

- A. Construction: Contractor's option.
- B. Provide 6 ft. (1.8 m) high fence around construction site; equip with vehicular gates with locks.

1.06 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.

1.07 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from the Port-occupied areas, to prevent penetration of dust and moisture into the Port-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces

1.08 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, and underground installations per project plans and specifications.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.
- D. Restore new permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes requirements relating to the following:
 - 1. Access roads
 - 2. Parking
 - 3. Construction parking controls
 - 4. Haul routes
 - 5. Maintenance
 - 6. Removal, repair

PART 2 - PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

- A. Post Mounted and Wall Mounted Traffic Control and Informational Signs, as specified.
- B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- C. Flag Person Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.02 ACCESS TO SITE

- A. Contractor shall conduct all business through the gate assigned by the Engineer.
 - 1. The Contractor may be required to relocate entry and related work areas as required by Port Operations.
- B. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.
- C. Provide and maintain access to fire hydrants free of obstructions.

3.03 PARKING

- A. All Contractor's employee cars and work vehicles will be parked on-site as designated by the Engineer.

3.04 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Port operations.
- B. Prevent parking on or adjacent to access roads or in non-designated areas.

3.05 HAUL ROUTES

- A. Confine construction traffic to designated haul routes.

- B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.06 MAINTENANCE

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction. Promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.07 REMOVAL, REPAIR

- A. Repair existing facilities damaged by use, to original condition.
- B. Repair damage caused by installation.

3.08 PUBLIC STREET AND ONSITE ROADWAY CLEANING

- A. The Contractor shall be responsible for preventing dirt and dust escaping from trucks and other vehicles operating on or departing the project site by sweeping, covering dusty loads, washing truck tires, and all other reasonable methods.
- B. When trucks and other equipment are operating on paved public streets and site roadways/paved surfaces, the Contractor will be required to clean said streets, roadways, and other paved surfaces at least daily, and at other times if required by the Engineer.
- C. In the event that the above requirements are violated and no action is taken by the Contractor after notification of infraction by the Engineer, the Port reserves the right to have the streets, roadways, and other paved surfaces in question cleaned by others and have the expense of the operation charged to the Contractor.

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. The Work shall consist of planning, installing, inspecting, maintaining and removing Temporary Erosion and Sediment Control (TESC) Best Management Practices (BMPs) to prevent pollution of air and water; and to control, respond to, and dispose of eroded sediment and turbid water during the term of the Contract.
- B. The Contractor shall use a project-specific SWPPP to meet or exceed the control measures required by the Washington Department of Ecology (Ecology). The SWPPP describes the proposed construction activities and all Temporary and Permanent Erosion and Sediment Control (ESC) measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during the proposed construction project. The Contractor shall have an individual who is a Certified Erosion and Sediment Control Lead (CESCL) on site or on-call at all times.
 - 1. The SWPPP consists of planning, installing, inspecting, maintaining, and removing TESC BMPs per Volume II of the Stormwater Management Manual for Western Washington (current version). The BMPs are designed to prevent pollution of air and water, to control peak volumetric flow rates and velocity of stormwater, and to control, respond to, and dispose of eroded sediment and turbid water during the term of the Contract.
 - 2. The Contractor will be responsible for updating the SWPPP to reflect changes to BMPs, as needed, to comply with the Construction Stormwater General Permit at no additional cost to the Port.
- C. These TESC requirements shall apply to all areas associated with the Work, including but not limited to the following:
 - 1. Work areas;
 - 2. Equipment and material storage areas;
 - 3. Staging areas;
 - 4. Stockpiles; and
 - 5. Discharge points within or adjacent to the work areas that are impacted by stormwater runoff from the site.
- D. Acceptance of TESC plans does not constitute an approval of permanent Work or drainage design (e.g., size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc.).
- E. Contractor shall read and conform to all requirements set forth in Washington Department of Ecology's (Ecology) NPDES General Permit for Discharges Associated with Construction Activities (CSGP).

1.02 REFERENCES

- A. The rules, requirements, and regulations that apply to this Work include, but are not necessarily limited to the following:
 - 1. Washington Department of Ecology, "Stormwater Management Manual for Western Washington," current version.

2. Washington Department of Ecology NPDES General Permit for Discharges Associated with Construction Activities (CSGP), current version.
3. Washington State Department of Transportation, current version, Standard Specification M41-10, Division 8-01 Erosion Control and Water Pollution Control.
4. Pierce County Stormwater and Site Development Manual, current version (if applicable).

1.03 SUBMITTALS

- A. Prior to the start of any construction activities, a Construction Stormwater Pollution Prevention Plan (SWPPP), as required by the CSGP.
 1. Contractor must adopt and comply with either a Port project SWPPP, or provide an alternative project SWPPP. A copy of the Port's short SWPPP form is provided in Appendix G.
 2. Contractor shall be responsible for updating the project SWPPP during construction to reflect the required changes to BMPs and personnel, as needed, to comply with the CSGP at no additional cost to the Port.
- B. Safety Data Sheet (SDS) for any dust palliative product.
- C. A copy of all Contractor site inspection logs and monthly Discharge Monitoring Reports (DMRs).
- D. The name and contact number of the Certified Erosion and Sediment Control Lead (CESCL).

1.04 AUTHORITY OF ENGINEER

- A. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations, as determined by analysis of project conditions; and to direct the Contractor to provide immediate permanent or temporary pollution control measures to minimize impacts to adjacent streams or other watercourses, lakes, ponds, and other areas of water impoundment.
- B. In the event that areas adjacent to the work area are suffering degradation due to erosion, sediment deposit, water flows, or other causes, the Engineer may stop construction activities until the Contractor rectifies the situation.

PART 2 – PRODUCTS

2.01 DUST CONTROL

- A. Dust palliative for dust control proposed by the Contractor and approved by the Engineer.

PART 3 – EXECUTION

3.01 GENERAL

- A. The Port is subject to a NPDES General Permit for Discharges Associated with Construction Activities (CSGP). The permit shall be transferred to the Contractor prior to ground disturbing activities. The Contractor shall be the responsible Operator/Permittee for the duration of the project.
- B. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply as determined by the Engineer.

- C. No project discharge of water shall be allowed that exceeds the regulated pollutant levels in Ecology's NPDES permit associated with the Project and any CSGP-associated Administrative Orders (if applicable).
- D. Contractor shall be solely responsible for all BMP modifications and upgrades to comply with the CSGP and the requirements of this Section, at no additional cost to the Port.
- E. Contractor shall be solely responsible for any damages and fines incurred because of Contractor, subcontractor, or supplier actions in implementing the requirements of this Section.
- F. The Contractor shall be solely responsible for schedule impacts incurred because of Contractor, subcontractor, or supplier actions in implementing the requirements of this Section.

3.02 TEMPORARY EROSION AND SEDIMENT CONTROL DEVELOPMENT

- A. The Contractor is responsible for developing the TESC BMPs and incorporating them into the SWPPP. The Contractor shall address the following issues as part of developing and implementing the BMPs.
 - 1. The TESC notes and details shown in the Drawings and the information in this Section of these Specifications are minimum requirements for the anticipated site conditions during the construction period. During the construction period the Contractor shall, at no additional cost to the Port, upgrade the TESC measures as needed for unexpected storm events and modify these measures for changing site conditions (such as relocation of ditches and silt fences, etc.) and update the SWPPP to document the modifications made.
 - 2. The Contractor shall inspect the TESC measures daily and maintain these measures to ensure continued proper functioning during the construction period. The Contractor will keep written records on site of inspections on a weekly basis during the wet season (October 1 through April 30) and on a monthly basis during the dry season (May 1 through September 30). The Contractor shall provide the Port with copies of the TESC inspections, as stated in Section 1.03 above.
 - 3. Any areas needing TESC measures not requiring immediate attention shall be addressed by the Contractor at the Port's discretion.
 - 4. The TESC measures in an inactive site shall be inspected and maintained by the Contractor at a frequency described in the Project Construction Stormwater NPDES General Permit.
 - 5. The Contractor shall be responsible for implementing the SWPPP and shall modify the SWPPP as required to reflect on-site activities and personnel. A copy of the Port's SWPPP short Form is provided in Appendix A.
- B. Contractor shall develop project-specific TESC BMPs and incorporate them into the SWPPP.
 - 1. The SWPPP shall comply with the requirements in Ecology's Volume II of the Stormwater Management Manual for Western Washington (current version) or equivalent.
 - 2. TESC notes and details shown in the Drawings and the information in this Section form a basis of the minimum requirements for a TESC Plan. Contractor shall develop a TESC Plan specific to the construction schedule and proposed means and methods prior to commencing construction activities for the duration of the Project.
- C. Contractor shall inspect the existing system and report to the Engineer the levels of existing material prior to installation of TESC BMPs.

3.03 TEMPORARY EROSION AND SEDIMENT CONTROL IMPLEMENTATION

- A. Contractor is responsible for implementing and updating the SWPPP including TESC BMPs.
 - 1. Contractor shall inspect the TESC measures daily and maintain these measures to ensure continued proper functioning for the duration of the Project.
 - 2. Contractor will be responsible for documenting TESC site inspections on a weekly basis in areas of active construction and on a monthly basis in areas that have undergone stabilization. Contractor shall keep records of the inspections on site.
 - 3. During the construction period the Contractor shall, at no additional cost to the Port, upgrade and/or maintain TESC measures as needed, based on Contractor means and methods, work sequencing, and changing site conditions (e.g., changes to impervious surface coverage, proximity of work to storm conveyance systems, storm events, etc.). Contractor shall modify these measures for changing site conditions and update the SWPPP to document all modifications made.
- B. Contractor shall clean all stormwater components affected by construction debris prior to Work completion, per TESC BMPs for catch basin maintenance. The cleaning process shall not flush sediment-laden water into a downstream system.
- C. Contractor shall ensure that water, or a dust palliative and a dispensing subcontractor, if needed, is available for project use. It is the responsibility of the Contractor to develop and adhere to appropriate safety measures pertaining to the palliative use. This also includes ensuring the dispensing subcontractor develops and adheres to the appropriate safety measures, if a dispensing subcontractor is used. Water used for dust suppression shall not be applied at such a rate or in a location that it will generate runoff from the site.
- D. Areas of exposed soils, including embankments, which will not be disturbed for two days during the wet season (October 1 through April 30) or seven days during the dry season (May 1 through September 30), shall immediately be stabilized by the Contractor with an Ecology-approved TESC measure (e.g., seeding, mulching, plastic covering, etc.).
- E. TESC measures in an inactive area shall be inspected and maintained by the Contractor until the area is permanently stabilized.
- F. In the event that additional temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the Work as scheduled or as ordered by the Engineer, such work shall be performed by the Contractor at its own expense.
- G. Contractor shall remove all TESC facilities, install permanent site surfacing improvements and permanent BMPs with minimal disturbance, and shall clean stormwater facilities prior to Work completion.
- H. Contractor shall terminate the CSGP upon final stabilization of the site.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the requirements to provide product data under the applicable specification section.

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.

PART 2 - PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.

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.

PART 3 - EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Prevent contact with material that may cause corrosion, discoloration, or staining.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes information on warranty, operation and maintenance manuals, and as built documentation.
- B. Prior to requesting final inspection, the Contractor shall assure itself that the project is complete in all aspects.

PART 2 - PRODUCTS

2.01 OPERATION AND MAINTENANCE MANUALS

- A. The following information (minimum of 3 copies) shall be furnished for all items of equipment on the Project requiring operational and/or maintenance procedures and for any additional items indicated by the Engineer:
 - 1. Lubrication Information: This shall consist of the manufacturer's recommendations regarding the lubricants to be used and the lubrication schedule to be followed.
 - 2. Control Diagrams: Diagrams shall show internal and connection wiring and as-built wiring diagrams (where applicable).
 - 3. Start-up Procedures: These instructions consist of equipment manufacturer's recommendations for installation, adjustment, calibration, and troubleshooting.
 - 4. Operating Procedures: These instructions consist of the equipment manufacturer's recommended step-by-step procedures for starting, operating, stopping the equipment under specified modes of operation, and for long-term shut-down (moth-balling).
 - 5. Preventative Maintenance Procedures: These instructions consist of the equipment manufacturer's recommended steps and schedules for maintaining the equipment.
 - 6. Overhaul Instructions: These instructions consist of the manufacturer's directions for the disassembly, repair and reassembly of the equipment and any safety precautions that must be observed while performing the work.
 - 7. Parts List: This list consists of the generic title and identification number of each component part of the equipment. This list shall include weights of individual components of each item of equipment weighing over 100 pounds.
 - 8. Spare Parts List: This list consists of the manufacturer's recommendations of number of parts which should be stored by the Port and any special storage precautions which may be required.
 - 9. Exploded View: Exploded or cut views of equipment shall be provided if available as a standard item of the manufacturer's information. When exploded or cut views are not available, plan and section views shall be provided with detailed callouts.
 - 10. Specific Information: Where items of information not included in the above list are required, they will be provided as described in the specifications for the equipment.
 - 11. Complete identification, including model and serial numbers.
 - 12. Submittal information, as specified in Section 013300 Submittal Procedures.

13. Warranty Information: This information consists of the name, address, and telephone number of the manufacturer's representative to be contacted for warranty, parts, or service information.
14. Maintenance information summaries shall be prepared on 8-1/2" x 11" paper and digital version (PDF format) on CD-ROM and shall contain the following information compiled from manufacturer's recommendations in the order shown.
 - a. Description or name of item of equipment
 - b. Asset number (to be provided at a later date)
 - c. Manufacturer
 - d. Name, address, and telephone number of local manufacturer's representative
 - e. Serial number (where applicable)
 - f. Equipment nameplate data
 - g. Recommended maintenance procedures:
 - 1) Description of procedures.
 - 2) Lubricant(s) or other materials required (where applicable), including type of lubricant, lubricant manufacturer, and specific compound.
 - 3) Additional information as required for proper maintenance.
 - h. Maintenance schedule, broken down into:
 - 1) Daily
 - 2) Weekly
 - 3) Monthly
 - 4) Quarterly
 - 5) Semi-Annually
 - 6) Annually
 - i. Recommended spare parts (where applicable)
 - j. Asset Number Information:
 - 1) Provide the following information in Excel spreadsheet format:
 - (a) Asset Number (to be provided at a later date)
 - (b) Description
 - (c) Plan Sheet Number
 - (d) Parcel Number
 - (e) Vendor
 - (f) Manufacturer
 - (g) Model Year
 - (h) Serial Number

- (i) Warranty - Start Date; Finish Date
 - (j) Required Preventative Maintenance
 - (k) Purchase Price
 - (l) Make
 - (m) Model
 - (n) Fuel Used
 - (o) Capacity
- 2) Asset Number Information will be required for the following items:
- (a) (a)
15. Provide video tapes, DVDs, and audio-visual training materials utilized in the manufacturer's instruction program for the Port.
 16. All such information shall be organized by the Contractor into 3-inch, 3-post, expandable metal binders. The binders shall be sized for material approximately 8-1/2 by 11 inches, and the material in the binders shall not protrude beyond the covers. The binder(s) shall be divided with coversheets for each major item of equipment. The cover sheets shall be typewritten to indicate the name, type of equipment, and location(s) within the Project where installed. A neatly typewritten index shall be provided. The number of copies of such binders to be submitted shall be equal to the total of the Contractor's requirements plus five (5) paper copies and an electronic copy in PDF format to be retained by the Port.
 17. All operation and maintenance information shall be comprehensive and detailed and shall contain information adequately covering all normal operation and maintenance procedures.
 18. All information shall be specific for the items of equipment installed on the project. Material not directly applicable shall be removed, omitted, or clearly marked as inapplicable.
 19. Lubricants shall be described in detail, including type, recommended manufacturer, and manufacturer's specific compound to be used.
 20. If manufacturer's standard brochures and manuals are used to describe operating and maintenance procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project.
 21. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated. It shall be the responsibility of the Contractor to ensure that all operation and maintenance materials are obtained. Material submitted must meet the approval of the Engineer prior to project acceptance.

PART 3 - EXECUTION

3.01 FINAL DOCUMENTS

A. Project As-Built Drawings

1. Project As-Built Drawings shall be compiled by the Contractor and submitted to the Engineer for translation to the Record Drawings on a monthly basis.
2. The Project As-Built Drawings will be submitted on paper full-sized (ANSI D) copy.

3. Drawings shall be kept current and shall be done at the time the material and equipment is installed. Annotations to the record documents shall be made with an erasable colored pencil conforming to the following color code:
 - a. Additions - Red
 - b. Deletions - Green
 - c. Comments - Blue
 - d. Dimensions - Graphite
 4. Project As-Built Drawings must be complete and accepted by the Engineer before Final Completion is issued.
 5. As-Built Drawings shall be in accordance with horizontal and vertical control as shown on the drawings.
- B. Final Survey
1. See Section 01 71 23 Field Engineering for Final Survey requirements. The Final Survey shall be completed and submitted to the Engineer within 30 days of Substantial Completion. Final Survey must be complete and accepted by the Engineer before Final Completion is issued.
- C. The following Certificates shall be submitted by the Contractor prior to Final Completion:
1. Certificates of Conformance
 - a. Notice of Termination (NOT) Construction Stormwater General Permit: (Confirmation of Termination request acceptance by DOE).

3.02 CLEAN-UP

- A. Definition: Except as otherwise specifically provided, "clean" (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.
- B. General: Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described above.
- C. Site: Unless otherwise specifically directed by the Engineer, hose down all paved areas on the site, all public sidewalks and catch basins on adjoining streets. Completely remove all resultant debris.
- D. Timing: Schedule final cleaning as approved by the Engineer to enable the Port to occupy a completely clean project.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes requirements relating to the following:
 - 1. Examination, preparation, and general installation procedures
 - 2. Cutting and patching

1.02 SUBMITTALS

- A. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project;
 - 2. Integrity of weather exposed or moisture resistant element;
 - 3. Efficiency, maintenance, or safety of any operational element;
 - 4. Visual qualities of sight exposed elements; and
 - 5. Work of the Port or separate Contractor.
- B. Project As-Built Documents: Accurately record actual locations of capped and active utilities.

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

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. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.

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

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.04 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; and
 - 8. Remove and replace defective and non-conforming work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. 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.

3.05 PROTECTION OF INSTALLED WORK

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

3.06 ADJUSTING

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

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes information for progress and final cleaning and restoration of damaged work prior to final inspection.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 PROGRESS CLEAN-UP

- A. The Contractor shall clean the project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with all requirements for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials for the type of material to be stored.
 - 4. Coordinate progress cleaning for joint use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free from waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration until Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.02 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances.
 - f. Remove debris and surface dust from limited access spaces, including roofs, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Remove labels that are not permanent.
 - i. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - j. Leave Project clean and ready for occupancy.

3.03 REPAIR OF WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surface, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- F. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).
- G. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals; 2024, with Errata (2025).
- H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.02 SUMMARY

- A. This Section includes fabrication and installation of the following:
 - 1. Metal plate connections for pre-engineered metal building.
 - 2. Metal baseplates for site perimeter fencing.

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General, Supplemental, and Special Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections:
 - 1. Section 13 34 19 – Metal Building Systems.
 - 2. Section 32 31 13 – Chain Link Fencing and Gates.

1.04 SUBMITTALS

- A. Product Data: For all raw materials and accessories including anchors and fasteners.
 - 1. Fasteners and anchors.
 - 2. Shop primers.
 - 3. Shrink-resistant grout.
 - 4. Steel plate.
- B. Welding Certificates: Provide copy of WABO certificates for welding personnel.
- C. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items for the following.
 - 1. Welded plate and metal building connections.
 - 2. Site fencing baseplates.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding Qualifications: Qualify procedures and personnel according to the following.
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- C. Welding Certification: Fabrication personnel to be WABO certified.

1.06 COORDINATION

- A. Coordinate installation of anchorage for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to the Project site in time for installation.
- B. Field verify all measurements and existing dimensions prior to fabrication. Contractor shall take special care to ensure all items are fabricated in a way that allows for installation within tight and constricted spaces.

1.07 WARRANTY

- A. Provide two-year warranty against defects in materials and workmanship.

PART 2 PRODUCTS

2.01 STEEL PLATE FABRICATIONS

- A. Fabricate in accordance with the Structural General Notes and approved shop drawings.
- B. Material: Steel angle meeting ASTM A36/A36M.
 - 1. Size: As indicated on the architectural and structural drawings.
- C. All steel plate to be hot-dip galvanized per ASTM A123/A123M.

2.02 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Provide minimum 1.7 oz/sq ft galvanized coating for steel members.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat in accordance with ASTM D6386.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

2.03 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

- B. Shrinkage-Resistant Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for exterior applications.
- C. Concrete: Comply with the Structural General Notes for normalweight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20684.28 kPa).
- D. Fasteners: As indicated in the Structural General Notes. To suit application unless noted otherwise, match fasteners exposed to view with the material and color/finish of the material being fastened.
 - 1. Fasteners not exposed to view: Galvanized steel unless otherwise noted
- E. Bolts, Nuts, Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- F. Welding Materials: AWS D1.1/D1.1M, type as required for materials being welded.
- G. Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII.
- H. Adhesive Anchors: Hilti HIT-HY 200 Epoxy.

2.04 FABRICATION, GENERAL

- A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- B. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (0.79 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- G. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications in place and to support indicated loads.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine and verify existing conditions and dimensions with fabricator prior to fabrication.
- B. Ensure all fabricated items can be safely transported to the work area without impacting campus operations or utilities.

3.02 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Corrosion Protection: Coat concealed surfaces of steel that come into contact with grout, concrete, masonry, wood, or dissimilar metals.

3.03 STEEL PLATE

- A. Field verify and provide steel angle to match existing size. Provide drilled holes to match size and spacing of existing anchor bolts.
- B. Hot-dip galvanize all angle members after fabrication.
- C. Install steel plate connections in accordance with the Structural General Notes and pre-engineered metal building approved shop drawings.

3.04 ADJUSTING AND CLEANING

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

3.05 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch (6.35 mm) in 10'-0", non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch (6.35 mm).
- C. For Mechanical Equipment: As required to maintain safe and reliable operation.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

1.02 SUMMARY

- A. Work under this sections includes:
 - 1. Joint sealants for exterior doors and wall openings.
 - 2. Sealant and filler joint backing.

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division-1 Specification sections, apply to work of this section.
- B. Related Sections include the following:
 - 1. Section 08 10 00 – Steel Doors and Frames.
 - 2. Section 08 36 00 – Overhead Sectional Doors.
 - 3. Section 13 34 19 – Metal Building Systems.
 - 4. Section 23 37 00 – Air Outlets and Inlets.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide paintable, exterior joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seal without causing staining or deterioration of joint substrates.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original unopened containers or bundles with labels informing about manufacturer, project name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi-component materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature change, contaminants, or other causes.

1.06 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – Submittal Procedures.
- B. Product data from manufacturers for each joint sealant required.
- C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- D. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed joint sealant application similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

- B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.08 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers. Or below 40 degrees Fahrenheit (4.44 degrees Celsius)
 - 2. When joint substrates are wet due to rain, frost, condensation, or other causes
- B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealer manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.09 WARRANTY

- A. Installer's warranty: Written warranty, signed by installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within the specified warranty period.
 - 1. Warranty period: 2 years from the date of substantial completion

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
- B. Colors: Provide selection made by Architect from manufacturer's standard colors for products of type indicated.
- C. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

2.02 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant which complies with ASTM C920 requirements, including those for Type, Grade, Class, and intended uses indicated in the 'Joint Sealant Schedule' located at end of this section.
- B. Available Products: Subject to compliance with requirements, elastomeric sealants that may be incorporated in the Work include, but are not limited to, the products specified in the "Joint Sealant Schedule" located at the end of this section.

2.03 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Plastic Foam Backer Rod: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible plastic foam of material indicated below and of size and shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, non-out-gassing in unruptured state and with diameter 40% greater than the joint width.
- D. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back or joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.04 MISCELLANEOUS MATERIALS

- A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction joint sealer substrate and field tests.
- B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.
- C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints as applicable.
- D. Accessory Materials for Fire-Stopping Sealants: Provide forming, joint fillers, packing and other accessory materials for installation of fire-stopping sealants as applicable to installation conditions indicated.

PART 3 EXECUTION

3.01 INSPECTION

- A. Require installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configurations, installation tolerances and other conditions affecting joint sealer performance.
- B. Do not allow joint sealer to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
- B. Remove all foreign material from joint substrates which could interfere with adhesion and cohesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellents; water; surface dirt and frost.
- C. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

- D. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- E. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primer to areas of joint sealer bond; do not allow spillage or migration onto adjoining surfaces.
- F. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing seal.

3.03 INSTALLATION OF JOINT SEALERS

- A. General: Comply with joint sealer manufacturer's printed installation instructions, including "tooling" and all techniques applicable to products and applications indicated, except where more stringent requirements apply
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
 - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers
 - c. Remove absorbent fillers which have become wet prior to sealant application and replace with dry material.
 - 2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- E. Sill weeps: Where weep holes exist at joints to be replaced with sealant and at lintel joints above openings, provide weeps and install sealant to assure weeps remain functional.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints

3.04 PROTECTION AND CLEANING

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to product joint sealer installations with repaired areas indistinguishable from original work.
- B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.05 ELASTOMERIC JOINT SEALANT SCHEDULE

- A. Urethane Joint Sealants (JS-1):
 - 1. Products:
 - a. Sonolastic "NP-1"
 - b. Sika, "Sikaflex 1a"
 - c. Tremco, "Vulkem 921"
 - d. Submit substitutions in accordance with Section 01 60 00 – Product Requirements.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- D. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- E. SSPC-SP 1 - Solvent Cleaning; 2015.
- F. SSPC-SP 3 - Power Tool Cleaning; 2024.
- G. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning; 2006.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Hollow metal steel doors and frames.

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General, Supplementary and Special Conditions, and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Section 07 92 00 – Joint Sealants.
 - 2. Section 08 71 00 – Door Hardware.
 - 3. Section 09 91 00 – Painting.
 - 4. Section 13 34 19 – Metal Building Systems.

1.04 1.03 DEFINITIONS

- A. Uncoated steel sheet thicknesses are indicated as the minimum thickness according to HMMA 803, Steel Tables.
- B. Metallic-coated steel sheet thicknesses are indicated as the minimum thickness of the uncoated base metal.

1.05 REFERENCES

- A. DHI – Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- B. SDI-100-85 - Standard Steel Doors and Frames.
- C. SDI-105 - Recommended Erection Instructions for Steel Frames.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of the Steel Door Institute, SDI-100.

- B. **Manufacturer Qualifications:** A firm experienced in manufacturing custom steel doors and frames similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

1.07 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. **Product Data:** Include construction details, material descriptions, core descriptions, label compliance, sound and fire-resistance ratings, and finishes for each type of door and frame specified.
- C. **Shop Drawings:** Show fabrication and installation of doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, dimensions of profiles and hardware preparation, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessories.
- D. Indicate frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, and finish.
- E. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- F. Operations and Maintenance information under the provisions of Section 01 70 00.
- G. **Door Schedule:** Submit schedule of doors and frames using same reference numbers for details and openings as those on Drawings.
 - 1. Coordinate glazing frames and stops with glass and glazing requirements.
- H. **Samples for Verification:** For each type of exposed finish required, prepare on Samples not less than 3 x 5 inches (127 mm) and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver doors and frames on pallets, wrapped, or crated to provide protection during transit and Project site storage. Use resilient packaging; do not use non-vented plastic.
- B. Break seal on-site to permit ventilation. Inspect doors and frames, on delivery, for damage. Minor damage may be repaired provided refinished items match new work and are approved by Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames under cover at building site. Place units on minimum 4-inch high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If wrappers on doors become wet, remove cartons immediately. Provide minimum ¼-inch spaces between stacked doors to permit air circulation.

1.09 WARRANTY

- A. **Special Warranty:** Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.
- C. Warranty period: 5 years

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide doors and frames by one of the following:
 - 1. Ceco Door Products
 - 2. Curries, an Assa Abloy Group company.
 - 3. Steelcraft, an Allegion brand.
 - 4. Substitutions: Under provisions of Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, CS (commercial steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, CS (commercial steel), Type B.
- C. Metallic-Coated Steel Sheets: ASTM A653/A653M, CS (commercial steel), Type B; with G60 zinc (galvanized) or A60 zinc-iron alloy (galvannealed) coating.
- D. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, zinc coat according to ASTM A153/A153M, Class C or D as applicable.

2.03 2.03 HOLLOW METAL FRAMES

- A. A. Fabrication - Frames: Fabricate frames of full-welded unit construction, with corners mitered, reinforced, and continuously welded full depth and width of frame. Knockdown frames are not acceptable.
 - 1. Level 3 – Heavy Duty. Form frames from 0.067-inch thick, metallic-coated steel sheets.
 - 2. Frame Metal Thickness: 14 gauge (exterior); 16 gauge (interior).
 - 3. Shop Priming.
 - a. Clean, treat and paint surfaces of fabricated hollow metal units including galvanized surfaces, whether concealed or exposed in the finished work.
 - b. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before the application of the shop coat of paint.
 - c. Apply pretreatment to cleaned metal surfaces, using cold phosphate solution (SSPC-PT2), hot phosphate solution (SSPC-PT4) or basic zinc chromate-vinyl butyl solution (SSPC-PT3).
 - d. Apply shop coat of prime paint within time limits recommended by pretreatment manufacturer. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 2.0 mils (0.0508 mm).
 - e. For all frames, in addition to prime coat, apply one coat of asphalt emulsion undiluted, to all concealed surfaces of frames; no exceptions.
 - 4. Field Finish: Interior and exterior finish under provisions of Section 09 91 00 – Painting.
 - 5. Fabrication:

- a. Fabricate frames as welded unit type.
 - b. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes.
 - c. Prepare frame for silencers. Provide three single rubber silencers for single doors on strike side.
 - d. Attach fire rated label to frame.
6. Anchors: Use manufacturer's standard jamb anchors or as indicated on drawings. (Use a minimum of 4 anchors per jamb.)
- B. Hardware Reinforcement: Fabricate from same material as frame. Minimum thickness of steel reinforcing plates for the following hardware:
1. Hinges and Pivots: 0.167-inch thick by 1-1/2 inches (38 mm) wide by 6 inches (152.4 mm) longer than hinge, secured by not less than 6 spot welds.
 2. Strike, Flush Bolts, and Closers: 0.093-inch.
 3. Surface-Mounted Hold-Open Arms and Panic Devices: 0.093-inch.
- C. Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.
- D. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A153/A153M, Class B.
- E. Jamb Anchors: Weld jamb anchors to frames near hinges and directly opposite on strike jamb as required to secure frames to adjacent construction.
1. Metal-Stud Partitions: Insert type with notched clip to engage metal stud, welded to back of frames, formed of same material as frame, not less than 0.042-inch thick. Provide at least the number of anchors for each jamb according to the following heights:
 - a. Three anchors per jamb up to 60 inches (1524 mm) in height.
 - b. Four anchors per jamb from 69 to 90 inches (2286 mm) in height.
 2. In-Place Concrete or Masonry: Anchor frame jambs with minimum 3/8-inch diameter concealed bolts into expansion shields or inserts 6 inches (152.4 mm) from top and bottom and 26-inches O.C., unless otherwise indicated. Reinforce frames at anchor locations. Except for fire-rated openings, apply removable stop to cover anchor bolts, unless otherwise indicated.
- F. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of same material as frame, 0.067-inch thick, as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners, welded to bottom of jambs and mullions.
 2. Separate Topping Concrete Slabs: Adjustable type with extension clips, allowing not less than 2-inch height adjustment. Terminate the bottom of frames at finish floor surface.
- G. Head Anchors: Provide 2 head anchors from frames more than 42-inches wide and mounted in steel-stud walls.

- H. Head Strut Supports: Provide 3/8 by 2-inch vertical steel struts extending from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
- I. Structural Reinforcing Members: Provide as part of frame assembly, where indicated at mullions, transoms, or other locations to be built into frame.
- J. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
- K. Rubber Door Silencers: Except on weather-stripped doors, drill stop in strike jamb to receive three silencers on single-door frames and drill head at strike side to receive two silencers on double-door frames. Install plastic plugs to keep holes clear during construction.

2.04 HOLLOW METAL DOORS

- A. General: Furnish flush-design doors, conforming to SD1-100-85, Level 4 - Maximum Duty, 1-3/4" thickness, Style 3 (Interior) Style 2 (Exterior), 16 gauge seamless-hollow steel construction unless otherwise indicated. Construct doors with smooth, flush surfaces without visible joints or seams on exposed surfaces or stile edges.
 - 1. Visible joints or seams around glazed or louvered panel inserts are permitted.
 - 2. For single-acting swing doors, bevel both vertical edges 1/8-inch in 2 inches (50.8 mm)
 - 3. Thickness: 16-gauge.
- B. Metallic Core Construction: Provide the following core construction welded to both door faces:
 - 1. Steel-Stiffened Core: 0.026-inch steel vertical stiffeners extending full-door height, space not more than 6 inches (152.4 mm) apart and spot-welded to face sheets a maximum of 6 inches O.C. Fill spaces between stiffeners with insulation of minimum 0.6-lb/cu.ft. density or sound deadener applied to inside surfaces of face sheets.
- C. Top and Bottom Channels: Spot weld metal channel not less than thickness of face sheet to face sheets not more than 6 inches (152.4 mm) o.c.
 - 1. Reinforce tops and bottoms of doors with inverted horizontal channels of same material as face sheet so flanges of channels are even with bottom and top edges of face sheets.
 - 2. For exterior doors, close bottom edge with metallic-coated steel closing channel and top edge with filler channel of same material, so webs of channels are flush with bottom and top door edges.
- D. Interior Doors: Fabricate face sheets of doors from two 0.0478-inch thick, cold-rolled, stretcher-leveled steel sheets and other metal components from hot- or cold-rolled steel sheets.
- E. Exterior Steel Doors: Fabricate face sheets of doors from two 0.053-inch thick, stretcher-leveled, metallic-coated steel sheets. Provide weep-hole openings in bottom of doors to permit entrapped moisture to escape. Seal joints in top edges of doors against water penetration.
- F. Sizes and Clearances: Furnish doors for openings sized as shown or scheduled, with clearances as specified above under "Dimensions".
- G. Door End Closures: Fabricate doors with top and bottom flush metal end closure treatment.

- H. Galvanizing for exterior doors provide same as specified above for frames; not required for interior doors.
- I. IShop Painting: Provide prime coat same as specified above for respective frames.
- J. Field finish under provision of 09 91 00.

2.05 HARDWARE REINFORCEMENT - ALL DOORS

- A. Fabricate reinforcing plates from the same material as door to comply with the following. Provide cut-outs and reinforcing for hinges, strikes and other mortise hardware; drill and tap at factory. Minimum gauges:
 - 1. Hinges and Pivots: 10 gauge; 0.1793-inch thick by 1-1/2 inches (38 mm) wide by 6 inches (152.4 mm) longer than hinge, secured by not less than 6 spot welds.
 - 2. Locks, Lock Face, Flush Bolts, Closers, Latches, Deadlocks, and Concealed Holders: 14 gauge; 0.1046-inch thick.
 - 3. All Other Surface-Mounted Hardware: 0.053-inch thick.

2.06 DIMENSIONING

- A. Verify opening sizes, exact wall materials and partition thickness prior to frame fabrication.
- B. Fabricate work to provide the following edge clearances:
 - 1. Provide beveled edges 1/8" in 2" or both vertical edges of doors.
 - 2. Provide 1/8" between doors and frames at head and jambs.
 - 3. Provide 1/8" at meeting edges of pairs of doors.
 - 4. Provide 1/8" door-to-stop clearance.
 - 5. Provide 3/4" maximum between door and sills where no threshold is used; 1/4" above carpeting.
 - 6. Provide 3/8" maximum between door and sills where threshold is used.

2.07 STOPS AND MOLDINGS

- A. Provide stops and moldings around solid, glazed, and louvered panels where indicated.
- B. Form fixed stops and moldings integral with frame, unless otherwise indicated.
- C. Provide removable stops and moldings where indicated or required, formed of 0.032-inch thick steel sheets matching steel frames. Secure with countersunk flat or oval head machine screws spaced uniformly not more than 12 inches (304.8 mm) o.c. Form corners with butte hairline joints.
- D. Coordinate rabbet width between fixed and removable stops with type of glass or panel and type of installation indicated.

2.08 FABRICATION

- A. Fabricate doors and frames rigid, neat in appearance, and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

1. Fabricate doors to comply with acceptance criteria of ANSI A250.4 for a Level A door.
- B. For doors with metallic core construction, weld cores to both door face sheets.
- C. Exposed Fasteners: Provide countersunk flat or oval heads for exposed screws and bolts, unless otherwise indicated.
- D. Hardware Preparation: Prepare doors and frames to receive hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series specifications for door and frame preparation for hardware.
 1. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
 2. Locate hardware as indicated or, if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

2.09 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for cleaning, treating, priming, and when specified, finishing.
- B. Field paint doors and frames in accordance with Section 09 91 00 - Painting.

2.10 METALLIC-COATED STEEL FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 1. Galvanizing Repair Paint: High-zinc-dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- B. Factory Priming for Field-painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.01778 mm).
 1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, primer complying with ANSI A224.1 acceptance criteria; recommended by primer manufacturer for zinc-coated steel; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

2.11 STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 3, "Power Tool Cleaning", or SSPC-SP 6/NACE No.3, "Commercial Blast Cleaning."
- B. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.01778 mm).

1. 1Shop Primer: Manufacturer's or fabricator's standard, fast-curing, corrosion-inhibiting, lead- and chromate-free, universal primer complying with ANSI A224.1 acceptance criteria; compatible with substrate and filed-applied finish paint system indicated; and providing a sound foundation for filed-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install steel door, frames, and accessories according to DHI A115.IG, Shop Drawings, manufacturer's data, and as specified.
- B. Frames: Install steel frames for doors, transoms, sidelights, borrowed lights, and other openings, of size and profile indicated.
 1. Floor anchors may be set with powder-actuated fasteners instead of masonry anchorage devices and machine screws, if so indicated on Shop Drawings.
 2. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - a. In Concrete construction install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Wet frames and secure to adjacent construction with bolts and masonry anchorage devices.
 - b. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel stud partitions, attach wall anchors to studs with screws.
 - c. Install fire-rated frames according to NFPA 80.
 - d. Field splice only at approved locations. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
 - e. Remove spreader bars from each frame only after frame is properly set and secured.
 - f. All hollow metal frames shall be grouted.
- C. Door Installation: Fit non-fire-rated doors accurately in their respective frames, within the following clearances specified in ANSI/SDI 100:
 1. 1Jambs and Head: 3/32-inch
 2. Meeting Edges, Pairs of Doors: 1/8-inch
 3. Bottom: 3/8-inch, if no threshold or carpet.
 4. Bottom: 1/8-inch, at threshold or carpet.

3.02 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items just before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- C. Stainless-Steel Touch-up: Immediately after erection, smooth any abraded areas of stainless steel and polish to match undamaged finish.

- D. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. This section includes the following:
 - 1. Galvanized Steel Sectional Overhead Doors.
 - 2. Electric operators, controls, and operating hardware.
 - 3. Sectional door tracks and supports.

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division-1 Specification sections, apply to work of this section.
- B. Related Sections:
 - 1. Section 13 34 19 – Metal Building Systems for pre-engineered building structure.
 - 2. Division 26 Sections for electrical connections to powered operators.

1.04 DEFINITIONS

- A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully opened position and returned to the closed position.

1.05 DESIGN/PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Structural Performance: Design and size components in coordination with the pre-engineered metal building (PEMB) manufacturer prior to fabrication.
 - 1. Wind Loads: As determined by the PEMB manufacturer's approved shop drawings.
 - 2. Seismic Loads: As determined by the PEMB manufacturer's approved shop drawings.
- C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- D. Wiring Connections: Refer to the electrical drawings.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.

- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated, and weathertight location above ground.

1.07 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 – 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. Installation methods.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Provide roughing-in-diagram, operating instructions and maintenance information. Include the following:
 - 1. Setting drawings, templates and installation instructions for built-in or embedded anchor devices to be attached to PEMB structure.
 - 2. Summary of forces and loads on walls and jambs.
 - 3. Blocking requirements for track, springs and other PEMB mounted items.
 - 4. Push button locations heights and associated conduit requirements.
 - 5. Motors: Show nameplate data and ratings; characteristics: mounting arrangements; size and location of winding treatment lugs, conduit entry and grounding tug; and coatings
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- F. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for work. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. Sectional door panel: 6 inches (152.4 mm) square min.
- G. Operation and Maintenance Data in accordance with Section 01 70 00.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.09 PROJECT CONDITIONS

- A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

- B. Coordinate with PEMB manufacturer during development of shop drawings to include any required anchorage or loads imposed on the structure.

1.10 WARRANTY

- A. Manufacturer Warranty: Manufacturer's limited door and operators System warranty for 10 years against delamination of polyurethane foam from steel face and all other components for 3 years or 20,000 cycles, whichever comes first.
- B. Workmanship Warranty: Written warranty, signed by installer agreeing to repair or replace overhead sectional door components that do not comply with performance and other requirements specified in this Section within the specified warranty period.
 - 1. Warranty period: 3 years from the date of substantial completion

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Overhead Door Corporation
 - 2. Wayne Dalton
 - 3. Raynor
 - 4. Or approved equal
 - a. Submit substitutions in accordance with Section 01 60 00.

2.02 SECTIONAL OVERHEAD DOORS

- A. Basis of Design Product: Overhead Door "Sectional Steel Door, Model 416".
 - 1. Door Assembly: Steel door assembly with rabbeted meeting rails to provide full-width interlocking structural rigidity.
 - 2. Panel Thickness: 2 inches (50.8 mm)
 - a. Exterior Surface: Flush.
 - b. Exterior Steel: 16-gauge, galvanized steel.
 - c. Center and End Stiles: 16-gauge, galvanized steel.
 - 3. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7-1 safety factor.
 - a. Standard cycle spring: 25,000 cycles.
 - 4. Air Infiltration: 0.08 cfm at 15 mph.
 - 5. Finish and Color: Manufacturer's standard two coat baked-on polyester.
 - a. Interior color: White.
 - b. Exterior color: White
 - 6. Wind Load Design: Provide to meet the Design/Performance requirements specified.

7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
 - a. Size: 2 inch (50.8 mm)
 - b. Type: Standard Lift

2.03 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Provide manufacturer's 3-inch reverse angle, galvanized-steel system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A653/A653M for minimum G-60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed. Weld or Bolt to track supports.
- B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A36/A36M and ASTM A123/A123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors. Use of center support on track back hang is required.
- C. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks. Stability and location of support is responsibility of the door hanger. The contractor will coordinate all required backing and blocking during framing.
- D. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door.
 1. Color as selected by Architect from manufacturer's full range of colors.
 - a. EPDM bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.

2.04 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079 inch (2.01 mm) nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over 16 feet (487.68 cm) wide unless otherwise recommended by door manufacturer.
- C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch (76mm) diameter roller tires with 3-inch 2.99 inch (76 mm) wide track.
- D. Lock: Interior mounted slide lock with interlock switch for automatic operator.

2.05 ELECTRIC DOOR OPERATORS

- A. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot (20.32 cm) nor more than 1 foot (30.48 cm) per second. Operator shall meet UL 325/2010 requirements for continuous monitoring of safety devices.
- B. Electric Door Operator: Standard duty, up to 25 cycles/hour and up to 90 cycles/day.
 - 1. Basis of Design: RSX Trolley 1 HP, Three Phase. Provide operations and control accessories as required for operation requirements specified.
 - 2. Operator Type: Trolley with Pusher Spring.
 - 3. Motor Exposure: Interior, clean, and dry.
 - 4. Emergency Manual Operation: Chain Hoist type.
- C. Electric Motors: High-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction from any position, at not less than 2/3 fps (0.2 m/s) and not more than 1 fps (0.3 m/s), without exceeding nameplate ratings or service factor.
 - 1. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
- D. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- E. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
- F. Entrapment Protection: Provide each motorized door with photoelectric sensors monitored to meet UL 325/2010, capable of protecting full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Manufacturer's heavy duty commercial photo eye system designed to detect an obstruction in door opening without contact between door and obstruction.
 - 2. Mount photo sensors at 6-inches above finish floor with adjustable brackets for alignment. Provide infrared transmitter and receiver sensors.
- G. Operator Controls:
 - 1. Push-button operated control stations with open, close, and stop buttons.
 - 2. Surface mounted, interior location to be selected by architect

PART 3 EXECUTION

3.01 EXAMINATION

- A. Coordinate with PEMB manufacturer during development of shop drawings to ensure all loads and anchorage points are accounted for.

- B. Verify placement of tracks and supporting members do not interfere with lighting, radiant heaters, or other suspended construction.
- C. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports according to approved Shop Drawings, manufacturer's written instructions, and as specified. Contractor to verify height of door operator with the Architect prior to installation.
 - 1. Door installer shall be responsible for the complete system for smooth operation of the doors. Due to the standard frame spacing, additional support framing may be required. It is the responsibility of the door installer to verify and provide adequate support for the doors including additional support framing coordinated between the framing contractor, door manufacture and all other trades including but not limited to electrical lighting, mechanical venting, heating, and building insulation systems.
- B. Fasten vertical track assembly to framing, spaced not less than 24 inches (609.6 mm) apart. Hang horizontal track from structural overhead framing with angle or channel hangers fastened to framing by welding or bolting or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
- C. Locate remote antenna on exterior of building with mounting kit and weather head, to be tested and approved by Owner prior to final acceptance.
- D. Power Operated Doors: Coordinate and install automatic overhead door openers in accordance with UL 325.
 - 1. Door manufacturer shall supply controls only.
 - 2. Electrical contractor shall install controls and furnish and install conduits and wiring for jobsite power and control wiring. All control wiring shall be brought to the point of connection by the electrical contractor.
 - 3. Connections to the control devices shall be by the door installer.

3.03 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup services.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.04 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and with weathertight fit around entire perimeter.

3.05 PROTECTION AND CLEANING

- A. Clean doors, frames and glass. Remove temporary labels and visible markings.

- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- C. Protect installed products until completion of project.
- D. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional overhead doors. Refer to Division 1 Section "Contract Closeout" and "Operation and Maintenance".
- B. Test transmission frequency of apparatus at substantial completion with owner to verify doors will not activate without a deliberate action.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2024.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- C. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2011.
- D. BHMA A156.1 - Standard for Butts and Hinges; 2021.
- E. BHMA A156.4 - Door Closers and Pivots; 2024.
- F. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems; 2023.
- G. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. ISO 9000 - ISO Standards Compendium: ISO 9000 - Quality management; 2015.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- K. NFPA 101 - Life Safety Code; 2015.
- L. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2025.
- M. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- N. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Exterior swinging metal doors.

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections:
 - 1. Section 08 10 00 – Steel Doors and Frames.
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC (IBC) International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.

6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

D. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL 10C – Positive Pressure Fire Tests of Door Assemblies.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in the same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in the schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. The owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by the manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturer's operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.05 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum five years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: Finish Hardware shall be installed only by experienced tradesmen in compliance with trade union jurisdictions, either at the door and frame fabrication plant or at the project site.
- C. Door Hardware Supplier Qualifications: Finish Hardware shall be supplied by recognized builder's hardware supplier who has been furnishing hardware in the same area as the project for a period of not less than two years. The supplier's organization shall include a member of the American Society of Architectural Hardware Consultants who is available at all reasonable times during the course of the work to meet with the Owner, Architect, or Contractor for project hardware consultation. Supplier shall be located within 200 miles (321.87 kilometers) of the project. Supplier shall be a distributor for the specified products, not a broker. Supplier shall maintain a warehouse and stock of specified hardware and replacement parts.
- D. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- E. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. The function of the building, the purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores, and software.
 5. Address and requirements for delivery of keys.
- F. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- G. At the completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference."

1.07 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.08 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by the manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
3. Seven years for heavy duty cylindrical (bored) locks and latches.
4. Five years for standard duty cylindrical (bored) locks and latches.
5. Twenty-five years for manual surface door closer bodies.

1.09 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fasteners
 1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
 4. Install hardware with fasteners provided by hardware manufacturer.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

1. Manufacturers and Products: Hager BB series, McKinney TA/T4A series, Stanley FBB Series.

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914.4 mm) wide:
 - a. Exterior: Standard weight, stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
3. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
4. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
5. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins

2.04 KEYING

A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Provide cylinders/cores keyed into Owner's existing factory registered keying system.

C. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

D. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
4. Identification:

- a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Do not provide blind code marks with actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
- a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.05 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4010/4110/4020 series.
2. Acceptable Manufacturers and Products: No Substitute.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17.46 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL 10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees Fahrenheit (48.89 degrees Celsius) to - 30 degrees Fahrenheit (-1.11 degrees Celsius).
5. Spring Power: Continuously adjustable over full range of closer sizes and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch top rail without use of mounting plate so that closer is not visible through vision panel from pull side.

8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.06 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide kick plates and armor plates minimum of 0.050 inch (1.27 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:
 - a. Kick Plates: 34 inches (863.6 mm) high by 2 inches (50.8 mm) less width of door on single doors, 1 inch (25.4 mm) less width of door on pairs

2.07 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson.
2. Acceptable Manufacturers: Rixson, Sargent.

B. Requirements:

1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior single acting doors.
2. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
3. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.08 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International.
2. Acceptable Manufacturers: National Guard, Reese.

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (12.7 mm) high by jamb width by door width
 - b. Bumper Seal Thresholds: 1/2 inch (12.7 mm) high by 5 inches (127 mm) wide by door width
4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.09 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 2. Continuous Hinges: BHMA 630 (US32D)
 3. Continuous Hinges: BHMA 628 (US28)
 4. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 5. Protection Plates: BHMA 630 (US32D)
 6. Overhead Stops and Holders: BHMA 630 (US32D)
 7. Door Closers: Powder Coat to Match
 8. Wall Stops: BHMA 630 (US32D)
 9. Latch Protectors: BHMA 630 (US32D)
 10. Weatherstripping: Clear Anodized Aluminum
 11. Thresholds: Mill Finish Aluminum

PART 3 EXECUTION

3.01 3.01 EXAMINATION

- A. A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 3.02 PREPERATION

- A. A. Where on-site modification of doors and frames is required:
 - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 - 2. Field modify and prepare existing door and frame for new hardware being installed.
 - 3. When modifications are exposed to view, use concealed fasteners, when possible.
 - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.03 3.03 INSTALLATION

- A. A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (762 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying section.
 - 2. Furnish permanent cores to Owner for installation.

- I. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- K. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- L. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- M. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- N. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 3.04 FIELD QUALITY CONTROL

- A. A. Engage qualified manufacturer trained representative to perform inspections and to prepare inspection reports.
 - 1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.05 3.05 ADJUSTING

- A. A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.06 3.06 CLEANING AND PROTECTION

- 1. A. Clean adjacent surfaces soiled by door hardware installation.
- 2. B. Clean operating items as necessary to restore proper function and finish.
- 3. C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.07 3.07 HARDWARE SCHEDULE

- A. A. Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.
- B. HWG-1:
 - a. 3 @ McKinney TA2314 NRP 4 ½" x 4 ½" hinges US32D.
 - b. 1 @ Sargent 8255 LW1L US26D entry mortise lock.

- c. 1 @ Medeco LFIC mortise cylinder housing.
- d. 1 @ Medeco LFIC.
- e. 1 @ Pemko 276A36 threshold.
- f. 1 @ Pemko 346C40 drip cap.
- g. 1 @ Pemko S88D17 door gasket.
- h. 1 @ Pemko 315CN36 door bottom.
- i. 1 @ Sargent 351UOEN closer.
- j. 1 @ ABH 1804 pipe stop & holder US32D.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. SSPC-SP 3 - Power Tool Cleaning; 2024.

1.02 SUMMARY

- A. Work in this section includes:
 - 1. Field application of high performance aliphatic acrylic polyurethane coatings.
- B. Items to be receive special coatings include:
 - 1. Hollow metal doors and frames.

1.03 SUBMITTALS

- A. Provide product data for each coating system specified, including block fillers and primers.
 - 1. Provide the manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
 - 2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
- B. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed coating system applications similar in material and extent to that indicated for this Project.
- B. Single-Source Responsibility: Provide primers and undercoat material produced by the same manufacturer as the finish coats for each type of coating. Use only thinners recommended by the manufacturer and only within recommended limits.

1.05 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's name, stock number and date of manufacture.
 - 4. Contents by volume, for major pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.

8. Handling instructions and precautions.

- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees Fahrenheit (7.22 degrees Celsius). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying the coatings.

1.06 1.06 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95 degrees Fahrenheit (35 degrees Celsius).
- B. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 degrees Fahrenheit (-15 degrees Celsius) above the dewpoint; or to damp or wet surfaces.
 - 1. Allow wet surfaces to dry thoroughly and attain the temperature and conditions specified before proceeding with or continuing the coating operation.
 - 2. Painting may continue during inclement weather if surfaces and areas to be coated are enclosed and the temperature within the area can be maintained within limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance, provide products by one of the following:
 - 1. Tnemec Company, Inc.
 - 2. Or approved equal.

2.02 SPECIAL COATING MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, finish coat material, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide the highest grade of the various coatings as regularly manufactured by acceptable coating manufacturers. Materials not displaying manufacturer's identification as a best-grade product will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas and conditions, with the Applicator present, under which coating will be performed for compliance with application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

2. Start of application will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which coatings are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. 1Notify the Engineer of anticipated problems using the coatings specified over substrates primed by others.

3.02 PREPARATION

- A. General: Remove hardware and hardware accessories, plate, machined surfaces, and similar items already installed that are not to be coated. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying coatings or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime. Notify the Engineer in writing of problems anticipated when using the specified finish-coat material with substrates primed by others.
 - a. Prepare surfaces to be painted in accordance with SSPC-SP 3 Surface Preparation (hand tools)
 - b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, solvent clean, and touch up with the same primer as the shop coat.
- D. Materials Preparation: Mix and prepare paint materials according to the coating manufacturer's written instructions.
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by the manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to facilitate identifying each coat where multiple coats of the same materials are to be applied. Tint undercoats to match the color of the finish coat but provide sufficient difference in shade to undercoats to distinguish each separate coat.

3.03 APPLICATION

- A. General: Apply special coatings by brush, roller, spray, squeegee, or other applicators according to manufacturer's written instructions. Use brushes best suited for the material being applied. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required
 - 1. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable coating film.
 - 2. Coating colors, surface treatments, and finishes are indicated in the Schedules.
 - 3. Provide finish coats that are compatible with primers used.
 - 4. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions sand between applications.
 - 5. If undercoats or other conditions show through the final coat, apply additional coats until the cured film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- B. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.
 - 1. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being coated.
 - 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to the material required to be coated or finished that has not been prime coated by others.
 - 1. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.

- F. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.
 - 1. Apply primers and first coat by brush unless the manufacturer's instructions permit using mechanical applicators.
- G. Mechanical Applications: Use mechanical methods to apply coating when permitted by the manufacturer's recommendations and governing regulations.
 - 1. Wherever using spray application, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of two coats in one pass, unless recommended by the manufacturer.
- H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with requirements.

3.04 PROTECTION

- A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing or replacing, and recoating, as approved by Engineer. Leave in undamaged condition.
- B. Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.05 SPECIAL COATING SCHEDULE

- A. Provide the following coating systems for substrates indicated.
- B. Interior and exterior structural steel framing members:
 - 1. High-Performance, Polyamide-Epoxy Coating System: Provide two coats of Aliphatic polyester polyurethane finish.
 - a. Primer: Tnemec Series 73 "Endura-Shield": 2- 3 mils (0.0762 mm) DFT
 - b. Finish Coats: Tnemec Series 73 "Endura-Shield": 2- 3 mils (0.0762 mm) DFT
 - c. Color: To be selected by the Engineer from manufacturer's standard colors.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

1.02 1.01 RELATED DOCUMENTS

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

1.03 SUMMARY

- A. This section includes the following:

- 1. Bolt down metal bollards.
- 2. Fire extinguishers.
 - a. Related Sections:

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 1. Metal Bollards: Include rating and classification.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- C. CFire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 BOLLARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Post Guard
 - 2. Beacon Industries, Inc.
 - 3. Perma Tech, Inc.
 - 4. Or approved equal.
- B. Bolt Down Metal Bollards:
 - 1. Basis of Design: Post Guard BDB 4-42, or comparable.
 - 2. Material: Schedule 40 steel with welded cap.
 - 3. Size: 4" outside diameter, 42" height.
 - 4. Finish: Powder coated, "Safety Yellow"

2.02 FIRE EXTINGUISHERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ansul, a Tyco Business
 - 2. Amerex
 - 3. Kiddie
 - 4. Or approved equal.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 - 1. Cartridge Operated: Spun shell.
 - 2. Stored Pressure Operated: Deep Drawn.
 - 3. Class: ABC type.
 - 4. Size: 5 pound (2.27 kg).
 - 5. Finish: Baked polyester powder coat, standard color to be selected.
 - 6. Mounting: Wall hung, provide all brackets and accessories.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Coordinate bollard placement with approved pre-engineered metal building (PEMB) shop drawings and structural foundations prior to installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with manufacturer's written instructions for installing specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

3.03 ADJUSTING, CLEANING, AND PROTECTION

- A. Provide final protection and maintain conditions that ensure that specialties are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufacturer designed and engineered metal building system.
- B. Preparation and submission of deferred submittals to the Authority Having Jurisdiction.
- C. Modification and attachment of metal building frames to an existing concrete slab.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 – Metal Fabrications.
- B. Section 07 92 00 - Joint Sealants.
- C. Section 08 10 00 – Steel Doors and Frames.
- D. Section 08 36 00 - Overhead Sectional Doors.
- E. Division 23 for mechanical systems and ventilation.
- F. Division 26 for electrical systems and site related infrastructure.

1.03 DESCRIPTION OF WORK

- A. General: Provide a rigid frame, pre-engineered metal building system with all accessories and miscellaneous materials for a complete enclosure including supports for building components specified in other sections.
- B. Pre-engineered metal building is a deferred submittal requirement of the building permit. Contractor is responsible for the preparation and submission of engineered structural calculations and shop drawings to the Authority Having Jurisdiction.
- C. Design structural systems according to professionally recognized methods and standards of the 2021 International Building Code with State of Washington and City of Tacoma amendments.
 - 1. Design shall be performed under the supervision of a professional engineer licensed in the State of Washington. All submittal documents including structural calculations and shop drawings shall be stamped and sealed by the professional engineer.
 - 2. Refer to the structural drawings for the connection of metal building frames to an existing concrete slab with embedded steel beams. Due to existing site conditions, below grade foundations will not be permitted.
 - 3. By submitting a bid, both the contractor and metal building manufacturer acknowledge the existing site conditions and foundation constraints.
- D. Refer to the architectural drawings for overall building dimensions, location and size of door openings, minimum interior clearances, and maximum roof heights.
- E. Mechanical building systems have been designed to comply as a “Low Energy Building” as defined in the 2021 Washington State Energy Code (WSEC), section C403.2.2.1.
- F. “Low Energy Buildings” shall be exempt from the thermal envelope requirements of the 2021 WSEC per section C402.1.1.1. Refer to the architectural drawings for thermal insulation installed for condensation control.
- G. Unless otherwise approved by the engineer, the following components shall be provided by the metal building manufacturer:

1. Roof system of purlins and mechanically seamed standing seam metal roof panels.
2. Wall system of girts, lateral bracing, and corrugated metal wall panels.
3. Manufactured skylight units with integral curb and roof flashing.
4. Metal flashings, closures, and trim necessary for a weathertight installation.
5. Continuous gutters and downspouts.
6. Sectional overhead doors including motor operators and accessories.

1.04 DESIGN CRITERIA

- A. Building shall be designed in accordance with the 2021 International Building Code with Washington State and City of Tacoma Amendments.
- B. Refer to the Structural General Notes and structural drawings for design criteria and loads.
- C. The lateral design criteria shall be:
 1. Wind Load
 - a. Wind Speed: per the structural drawings and Structural General Notes.
 - b. Exposure: per the structural drawings and Structural General Notes.
 - c. Importance Factor: per the structural drawings and Structural General Notes.
 2. Seismic Load:
 - a. Design Category: per the structural drawings and Structural General Notes.
 - b. Risk Category: per the structural drawings and Structural General Notes.
 - c. Importance Factor: per the structural drawings and Structural General Notes.
 - d. Site Class: per the structural drawings and Structural General Notes.
 - e. Mapped spectral acceleration parameters: per the structural drawings and Structural General Notes.
 - f. Spectral Response Coefficients: the structural drawings and Structural General Notes.
- D. Thermal Movements: allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 degrees Fahrenheit (48.89 degrees Celsius), ambient; 180 degrees Fahrenheit (82.22 degrees Celsius) material surfaces.
- E. The building structure frame shall be clear span rigid frame solid web type with tapered sections designed in accordance with AISC Type 1 construction. Roof slopes shall be as indicated on drawings. All column bases shall be designed as pin connected.
- F. Design of structural steel sections on welded plate members shall be based upon the applicable specifications of ASIC as determined by the manufacturer and approved by the Owner's representative. Light-gauge, cold-formed structural members and exterior collaring's shall be designed based upon the applicable sections of AISI (Specifications for the Design of Cold – Formed Steel Structural Members) and as determined by the manufacturer.

- G. The design of the primary and secondary structural framing as well as roof and wall covering shall be designed for all applicable loads and combination of these loads as set forth in the latest edition of the MBMA Recommended Design Practices Manual and applicable codes as indicated on Contract Drawings.
- H. Bracing in the plane of the roof and vertical wall bracing shall be round rods or angle bracing as determined by the building manufacturer. Vertical bracing shall be located in bays shown on drawing such that it does not interfere with door openings.
- I. The building shall be designed to carry the following roof loads in addition to loads prescribed by Code:
 - 1. Snow load: per the structural drawings and Structural General Notes. Loads may not be reduced.
 - 2. Collateral (Mechanical & electrical): per the structural drawings and Structural General Notes.
- J. Design calculations for the specified structure shall be performed by the manufacturer's engineer experienced in pre-engineered metal buildings. These design calculations shall be made available as per Specifications. The vendor's engineer shall be a civil or structural engineer registered in the state of Washington where the project is located.
- K. The new building will be insulated with blanket insulations. The insulation will be provided and installed by the metal building system vendor and shall meet current Washington State Energy Code requirements.
- L. The metal building system vendor shall coordinate all work with General Contractor. This includes but is not limited to framed openings, anchor bolts, mechanical and electrical rough in, etc.

1.05 QUALITY CONTROL

- A. The pre-engineered metal building and related products shall be as manufactured by a nationally known company that has specialized in the design, fabrication, and erection of pre-engineered metal building for a minimum of ten (10) years.
- B. The manufacturer shall comply with the requirements of the International Building Code, 2021 edition with Washington State and City of Tacoma Amendments. In addition, the building design and fabrication shall conform to recommended standards and design criteria as set forth by the following engineering societies and institutes:
 - 1. American Institute of Steel Construction - "Specifications for Design, Fabrication and Erection of Structural Steel Buildings".
 - 2. American Welding Society - "Code for Welding in Building Construction".
 - 3. American Institute of Steel Construction - "Code of Standard Practice for Steel Buildings and Bridges".
 - 4. "Metal Building Systems Manual" prepared by the Metal Building Manufacturer's Association.
- C. The manufacturer shall coordinate anchor bolt design and location with the existing concrete slab and embedded steel beams. Refer to the structural drawings.

1.06 SUBMITTALS

- A. Submit under provisions of 01 33 00 – Submittal Procedures.

- B. Product Date: Provide date of manufacture on profiles component dimensions, fasteners.
- C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchors, and methods and anchorage, and installation; framing anchor bolt setting, sizes, locations from datum; foundation loads; indicate welded connections with AWS A2A welding symbols; indicate net weld lengths.
 - 1. Shop drawings shall be stamped and sealed by a Professional Engineer registered in the State of Washington.
- D. Samples: Submit two samples of precoated metal panels for each color selected. Provide 2 by 4 inch (101.6 mm) in size illustrating color and texture of finish.
- E. Erection drawings: Indicate member by label, assembly sequence and temporary erection on bracing.
- F. Designer's Qualification Statement.
- G. Manufacturer's Qualification Statement. Provide Documentation showing metal building manufacturer is accredited under IAS AC472.
- H. Erector's Qualification Statement.
- I. 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.
- J. Project Record Documents Record actual locations of concealed components and utilities.
- K. Sample Warranties specified in paragraph 1.08.

1.07 WARRANTY

- A. General Contractor shall provide the following warranties:
 - 1. Manufacturer shall warranty installed system for the periods described herein, starting from Date of Substantial Completion or ninety days from delivery, whichever comes last, against all the conditions indicated below. When notified in writing from Owner, manufacturer/installer shall, promptly and without inconvenience and cost to Owner, correct said deficiencies.
 - a. Materials and Workmanship Warranty: 3 years.
 - b. Panel Rib Standard Weathertight Warranty: 10 years.
 - c. Finish Warranty:
 - 1) Finish coating shall not peel, blister, chip, crack or check in finish, and shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D4214.
 - 2) Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244.
 - d. Panel Finish: 25 years.
 - e. Performance Warranty: Furnish written warranty, stating sheet metal roofing system and flashing (flashing under premium warranty only) under this Section will be maintained in watertight condition and defects resulting from the following items will be corrected without cost to Owner for a period of 10 years.

- 1) Faulty workmanship.
- 2) Defective materials including sealants and fasteners.
- 3) Water infiltration.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Metal Building Systems: Subject to compliance with all specified requirements. Provide pre-engineered metal building systems from one of the following manufacturers.
 1. Varco Pruden Building Systems: www.vp.com
 2. Bulter Manufacturing Company www.butlermfg.com
 3. Ceco Building Systems: www.cecobuildings.com
 4. Nucor Building Systems: www.nucorbuildingsystems.com
 5. Substitutions: See Sections 01 60 00 – Product Requirements.

2.02 COMPONENTS

1. Clear Span Rigid Frames: refer to the Architectural and Structural drawings.
2. Primary Framing: Rigid frame of rafter beams and columns, end walls columns, and wind bracing.
3. Secondary Framing: Purlins, and other items detailed.
4. Wall system: Preformed metal panels of vertical profile with sub-grit framing/anchorage assembly and accessory components.
5. Roof Slope: See Architectural drawings.

2.03 MATERIALS - GENERAL

- A. All cold-formed structural steel members shall conform to ASTM A-570, Grade 55, milled (minimum) for structural members.
- B. All hot-formed welded and seamless structural steel tubing shall conform to ASTM A- 501.
- C. All structural steel members and accessories exposed to weather shall be hot-dipped galvanized, and otherwise primed and painted.
- D. Lateral bracing rods shall be adjustable threaded steel rod, conforming to ASTM A-36.
- E. Tubing or pipe for structural use shall conform to ASTM A-500, Grade B.
- F. Bolts shall conform to ASTM A-325, galvanized.
- G. Anchor bolts conforming to ASTM F-1557.

2.04 PERFORMANCE REQUIREMENTS

- A. Installed Thermal Resistance of Roof Systems: R-10 fiberglass batts with liner facing for condensation control only.
- B. Design structural members to withstand dead load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.

- C. Exterior wall and roof system shall withstand imposed loads with maximum allowable deflection of 1/180 of span.
- D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- E. Permit movement of components without buckling, failure of Joint seals, undue stress on fasteners or other detrimental effects, when Subject to temperature range of 120 degrees.
- F. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

2.05 MATERIALS – FRAMING

- A. Structural Steel Member: ASTM A572/A572M Grade 50.
- B. Structural Tubing: ASTM A500/A500M Grade B cold-formed.
- C. Plate or Bar Stock ASTM A529/A529M Grade 50.
- D. Anchor Bolts: ASTM A307, ASTM F1554, with hot dip type for protective coatings.
- E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1; galvanized to ASTM A153/A153M.
- F. Welding Materials: Perform in accordance with AWS D1.1/D1.1M.
- G. Primer: SSPC-Paint 20 Zinc Rich.
- H. 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.

2.06 MATERIALS – WALL AND ROOF

- A. Steel sheet: Hot dipped galvanized steel sheet. ASTM A653/A653M, Designation SS (structural steel), Grade 33 (230), with G90/Z275 coating.
- B. Joints Seal Gaskets: Manufacturer's standard type.
- C. Fasteners: Manufactures standard type, galvanized to comply with requirements of ASTM A153/A153m, 1 inch (25.4 mm) to math adjacent surface when exterior exposed.
- D. Bituminous Paint: Asphaltic type
- E. Sealant: ASTM C920, elastomeric sealant with movement capability of at least plus/minus 50 percent; 100 percent silicone; for exposed applications, match adjacent colors as closely as possible.
- F. Trim, Closure Pieces. Caps, Flashing Gutters, Downspouts, Rainwater Diverter, Facias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.07 ACCESSORY COMPONENTS

- A. Doors and Frames: Specified in Sections 08 10 00.
- B. Overhead Doors: Specified in Section 08 36 00.
- C. Wall Louvers: Specified in Section 23 37 00 – Air Outlets and Inlets.

2.08 FABRICATION – FRAMING

- A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.
- C. Provide wall opening framing for doors, windows, and other accessory components.

2.09 FABRICATION – WALL AND ROOF PANELS

- A. Siding: Minimum 24-gauge metal thickness, exposed fastener type, with high ribs 1-1/4 inch (32 mm) nominal) spaced 12 inches (304.8 mm) on center and minor ribs at 4 inches (101.6 mm) on center, lapped edges fitted with continuous gaskets.
 - 1. Panel width: 36 inches (914.4 mm)
 - 2. Surface texture: Smooth. Embossed texture is prohibited.
- B. Roofing: Minimum 24-gauge metal thickness, fastened with concealed clips and 2" mechanically seamed ribs at 16" on center.
 - 1. Panel width: 16 inches (406.4 mm)
 - 2. Surface texture: Smooth. Embossed texture is prohibited.
- C. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.
- D. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to require angles. Back brace mitered internal corners with 24-gauge thick sheet metal.
- E. Flashings, Closure Pieces, Fascia – Same material and finished as adjacent material, profile to suit system.
- F. Fasteners: to maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

2.10 FABRICATION – GUTTERS AND DOWNSPOUTS

- A. Fabricate of same material and finish as roofing metal.
- B. Form gutters and downspouts of indicated profile and size indicated to collect and remove water. Fabricate with connection pieces.
- C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at Joints.
- D. Fabricate support straps for same material and finish as roofing metal, color as selected.

2.11 FINISHES

- A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.
- B. Exterior Surfaces of wall Components and Accessories: Precoated enamel on steel of modified silicone finish, color as selected from manufacturer's standard range.
- C. Interior Surfaces of Wall Components and Accessories: Precoated enamel on steel of modified silicone finish, color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that foundation, slab, mechanical and electrical utilities, and placed anchors are in correct position.
- B. Examine the foundations and the conditions under which pre-engineered building is to be installed, and the work is to be performed. Notify Consultant in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.
- C. The building manufacturer shall provide onsite observation, assistance and necessary training or instruction to their franchised or approved erector/installer as is reasonably necessary to provide a satisfactory installation.

3.02 ERECTION – FRAMING

- A. Erect framing in accordance with AISC 360.
- B. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.
- F. Use concealed fasteners except where indicated.
- G. Install sealant and gaskets, providing weather tight installation.

3.03 ROOFING AND SIDING PANELS

- A. Erect in accordance with AISC-S310 Specifications for the Design, Fabrication and Erection of Structural Steel for Building Section 1.28.3, AISC-S302 Code of Standard Practice Section 7(h), and the Manufacturer's Recommended Installation Procedures and Instructions.
- B. Erect square, level, plumb and in proper alignment.
- C. Fasten panels to structural members by the method recommended by the manufacturer. Seal joints as required for weather and dust tightness. Install with panel joints oriented in accordance with manufacturer's recommendation for prevailing wind direction.
- D. End laps for any one type of roofing and siding shall be at the same elevation, occur at a girt and lap not less than two (2) inches.
- E. Space and align fasteners at supports, end and side laps as recommended by the manufacturer.
- F. Install flashings as needed to provide weather and dust tightness.
- G. Provide closures as required for weather and dust seal.
- H. Apply sealant in accordance with the sealant manufacturer's published specifications.
- I. Reinforce penetrations and openings larger than one (1) square foot and less than ten (10) square feet to sustain design loads.
- J. Touch up scratches, gouges and other damage to the finish on roofing and siding and flashing as recommended by the coating manufacturer.

3.04 GUTTERS AND DOWNSPOUTS

- A. Rigidly support and secure components Join lengths with formed seams sealed watertight flash and seal gutters to downspouts.
- B. Slope gutters minimum 1/32 inch (0.79 mm) per linear foot.
- C. Connect downspouts to biofiltration planters provided by Owner.

3.05 INSTALLATION – ACCESSORY COMPONENTS IN WALL SYSTEM

- A. Install door frames, doors, and overhead doors in accordance with manufacturer's instructions.
- B. Install support, back plates, flashing, trim, and seals as necessary for watertight seal between the wall system and any wall-mounted items, including but not limited to electrical receptacles and light fixtures.

3.06 TOLERANCES

- A. Framing Members: ¼ inch from Level, 1/8 inch (3.18 mm) from plumb.
- B. Siding and Roofing: 1/8 inch (3.18 mm) from true position.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. CAGI - The Compressed Air and Gas Handbook; 2003.

1.02 RELATED REQUIREMENTS

- A. AIA Document A201 "General Conditions of the Contract for Construction" with supplements thereto, special conditions and applicable portions of Division 1 are hereby made a part of this division of the specifications and shall apply to work under this Division of the specifications.

1.03 WORK INCLUDED

- A. The work of Divisions 23 consist of providing labor and products, and of performing all operations required for the complete operating installation of all mechanical systems as shown and specified, in strict accordance with this and all sections of these specifications, applicable drawings, terms, and conditions of the contract, and all applicable codes and ordinances governing installation of the various mechanical systems. Coordinate all work fully with the work of other crafts. Provide all systems complete and in proper operating order.

1.04 INTENT OF DRAWINGS

- A. Drawings and specifications are complementary, each to the other; what is shown on one is as binding as if called for in both.
- B. The drawings are partly diagrammatic and do not show all offsets in ducts or piping or exact location of piping, ducts, etc. Also, the drawings do not necessarily show in detail all features of the installation. It is the responsibility of the Contractor to provide equipment that fits into the space allotted and allows adequate acceptance clearances for installation, replacement, entry, servicing and maintenance.
- C. Refer to details, diagrams and schematics, in addition to all Mechanical Specifications, for detailed requirements for isolating valves, drain valves, vents, instruments, flexible connectors and similar components.
- D. If there appears to be insufficient space to install the mechanical work as shown, the A/E shall be notified prior to proceeding with the work. Failure to comply with this requirement will be considered sufficient cause to require altering the work, at no additional cost to the contract, as directed by the A/E.

1.05 CODES, PERMITS, STANDARDS, INSPECTIONS AND FEES

- A. All materials furnished and all work installed shall comply with the current versions of the National Fire Codes of the National Fire Protection Association, International Building Code, International Mechanical Code, Uniform Plumbing Code, Washington State Energy Code, Federal, State and Local standards, with the requirements of local utility companies, and with the requirements of all governmental agencies and departments having jurisdiction.
- B. All materials and equipment for the electrical portion of the mechanical systems shall bear the approval label, or shall be listed by the Underwriters' Laboratories, Inc.

- C. The Contractor shall give all necessary notices, obtain all permits and pay all government sales taxes, fees and other costs, including utility connections or extensions, in connection with his work; file all necessary plans, arrange for all necessary inspections, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for his work, and deliver three copies of same before request for acceptance and final payment for work.
- D. The Contractor shall include in the work, without extra cost, any labor, materials, services, apparatus, drawings, in order to comply with all applicable laws, ordinances, rules and regulations.
- E. Nothing in the Drawings or Specifications shall be construed as directing or permitting work which is not fully in conformance with Codes and Regulations.
- F. Where the Drawings or Specifications indicate materials or construction which exceeds the quality or size required by Codes and Regulations, the provisions of the Drawings or Specifications take precedence over the requirements of the Codes and Regulations.
- G. Any variance from code requirements shall be promptly reported to the A/E. No work shall be installed which is not in accordance with Codes and Regulations.

1.06 REVIEW OF MATERIAL AND EQUIPMENT SUBMITTALS

- A. General: Procedures and requirements for submittals are addressed in Division 1. In addition, comply with specific requirements of the individual sections and as noted herein.
- B. Submittals: Provide submittals for all products and systems described in Divisions 21, 22 and 23 and shown on the Drawings to demonstrate compliance with the requirements of the project. Furnish equipment submittals in the manner described elsewhere in these Specifications. In addition, include data for review, organized as noted below. No work shall begin or products ordered until submittals are approved.
- C. Data Required for Review: Mark submittal literature clearly in PDF format, and include all equipment and material shown on drawings and specified. Submittals not organized and prepared as follows will be returned to the Contractor for compliance prior to any detailed review. Indicate the following:
 - 1. Table of Contents listed by specification index sections.
 - 2. Specification reference and/or drawing reference for which literature is submitted.
 - 3. Manufacturer's name and address, and supplier's name, address and telephone number.
 - 4. Catalog designation or model number.
 - 5. Rough-in data and dimensions.
 - 6. Performance curves and rated capacities.
 - 7. Operation characteristics.
 - 8. Catalogs, pamphlets, or other documents submitted to describe items on which approval is being requested shall be specific, and identification in catalog, pamphlet, etc., of item submitted shall be clearly made. Data of a general nature will not be accepted. When equipment submitted is of a different size or weight, or has different access, service or installation clearances, than the designed equipment, the equipment submittals shall clearly note the differences.
 - 9. Working construction drawings (shop drawings).

- D. Partial Submittals: If other than a complete submittal is made, the Contractor may make partial submittals separated into complete specification section classifications. Piece-meal submittals will be returned without review, except for special situations.
- E. Submittal review is for general design and arrangement only, and does not relieve the Contractor from any of the requirements of the Contract Documents. Submittals will not be checked for quantity, dimension, fit, or proper technical design of manufactured equipment. Where deviations of substitute product or system performance have not been specifically noted in the submittal by the Contractor, provision of a complete and satisfactory working installation is the sole responsibility of the Contractor.
- F. Equipment Deviations:
 - 1. Items of equipment or material designated in the plans or specifications by use of a specific manufacture and number are so noted to indicate a standard of design and not necessarily to be restrictive. Substituted equipment or materials shall be equivalent in capacities, weight, acoustical performance and electrical requirements to the equipment used as the basis for the design. Note that a manufacturer's product may be listed as an approved substitute but may still have different electrical requirements from the product listed as the basis for the design.
 - 2. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawing which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign, all new drawings and detailing required therefore, and all additional construction costs, shall be prepared by the Contractor at his own expense and approved by the A/E.
 - 3. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Contract. The submittals shall clearly indicate any difference in requirements of other trades from the product listed as the basis for the design.
 - 4. If the dimensions or access requirements for equipment submitted differ from equipment dimensions or access requirements indicated on the drawings the submittals shall be clearly marked to indicate the differences. The Contractor shall be responsible for selecting equipment which fits the available space as well as being equivalent to the specified equipment.
 - 5. All materials shall be furnished and installed in conformance with Codes and Regulations.
 - 6. All equipment of the same type, such as valves, fittings, fixtures, fans, control components, etc., shall be products of the same manufacturer, used as recommended by the manufacturer.

1.07 ABBREVIATIONS/DEFINITIONS

- A. A/E Architect/Engineer
- B. AGA American Gas Association
- C. AISC American Institute of Steel Construction
- D. AMCA Air Moving and Conditioning Association

- E. ANSI American National Standards Institute
- F. ARI Air-Conditioning and Refrigeration Institute
- G. ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
- H. ASME American Society of Mechanical Engineers
- I. ASTM American Society for Testing and Materials
- J. AWS American Welding Society
- K. AWWA American Water Works Association
- L. CAGI Compressed Air and Gas Institute
- M. CISPI Cast Iron Soil Pipe Institute
- N. F Degrees, Fahrenheit
- O. FRP Fiberglass Reinforced Plastic
- P. FM Factory Mutual Engineering Corporation
- Q. ICBO International Conference of Building Officials
- R. MSS Manufacturer's Standardization Society
- S. NEMA National Electrical Manufacturer's Association
- T. NEC National Electrical Code
- U. NFPA National Fire Protection
- V. psig Pounds per square inch gage pressure
- W. SMACNA Sheet Metal and Air Conditioning Contractors National Association
- X. UL Underwriters Laboratories, Inc.
- Y. v Volts
- Z. wp Working Pressure (psig)
- AA. wg Water gage

1.08 SPECIFICATION TERMINOLOGY

- A. Streamlining: In many instances, the products, reference standards, and other itemized specifications have been listed without verbiage. In these cases, it is implied that the Contractor shall provide the products and perform in accordance with the references listed.
- B. "Provide", as used in this division of the specifications, means furnish all material, labor, sub-contracts, and appurtenances required, including mark-up, and install to a complete, operating, finished condition.
- C. "Install", as used in this division of the specifications, means to set in place and connect, ready for use and in complete, operating, finished condition, material that has been furnished by other than the Mechanical Contractor.

- D. "Rough-in and Connect Only" means provide an appropriate system connection such as supplies with stops, continuous wastes with traps, shut-off valves required, and all piping connections, testing, etc., for proper operation, and to connect equipment furnished by other than the Mechanical Contractor. Equipment furnished is received, uncrated, assembled and set in place by supporting crafts unless they make prior arrangements to hire the mechanical installer for this work.
- E. "Accessible" means arranged so that an average size man may complete any service required without disassembly or damage to the surrounding installation.
- F. "Serviceable" means arranged so that the component or product in question may be properly serviced without disassembly, destruction, or damage to the surrounding installation or item being serviced.
- G. "Product" is a generic term which includes materials, equipment, fixtures and any physical item used on the project.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 COOPERATION WITH OTHER TRADES

- A. This Contractor shall give full cooperation to other trades and shall furnish in writing to other contractors, with copies to the A/E, any information necessary to permit the work of all trades to be installed satisfactorily, with the least possible interference or delay, and with maximum headroom and clearance.
- B. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

3.02 PROTECTION

- A. The Contractor shall protect all work and material from damage by his work or workmen, and shall be liable for all damage thus caused.
- B. The Contractor shall be responsible for work and equipment until finally inspected, tested, and accepted; he shall protect work against theft, injury or damage; and shall carefully store material and equipment received on site which are not immediately installed. He shall close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

3.03 SCAFFOLDING, RIGGING, HOISTING

- A. The Contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

3.04 MATERIAL AND WORKMANSHIP

- A. All materials and apparatus required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the A/E shall be furnished.

- B. The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welders, helpers and labor required to unload, transfer, erect, connect-up, adjust, start, operate, and test each system.
- C. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with the approval of the A/E in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.
- D. As required by requirements of the Mechanical Specifications, other portions of the Specifications, and Standards to which reference is made in the Specifications, or where prohibited by Codes, Regulations and Ordinances, no materials shall be installed which exceed the allowable limits of flame-spread or smoke-developed indexes, or which do not meet the requirements for Approved Plastic Materials as defined in the Uniform Building Code. (No exposed PVC materials shall be installed in the building.)

3.05 INSTALLATION

- A. Cutting and Patching: Keep cutting and patching to a minimum. If required, all patching shall conform to specifications for the new General Construction work. Finish to match existing work. Conform to Division 1.
- B. Measurements: Verify space availability by field measurement prior to submitting shop drawings for approval.
- C. Roughing-In Dimensions: Obtain roughing-in dimensions for equipment from approved shop drawings or actual equipment measurements.
- D. Manufacturer's Installation Instructions: Follow manufacturer's written instructions where furnished. If the details are in conflict with design drawings, notify the A/E prior to proceeding with the installation.
- E. Accessibility: Install all equipment which requires periodic servicing or repairs so it is readily accessible. Otherwise, obtain the A/E's approval of location.
- F. Provision for Light Fixtures: In installing piping and ductwork, allow clearance for light fixtures. If interferences occur, move the piping or ducts and, if not possible, notify the A/E.
- G. Delivery, Storage, and Handling.
 - 1. Handle, store and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations and as approved by the A/E. Replace damaged or defective items.
 - 2. Factory finished equipment which is damaged shall be refinished as required to bring the equipment to a like-new condition in accordance with manufacturer's recommendations. If, in the opinion of the A/E, the equipment cannot be satisfactorily repaired, the equipment shall be replaced.

3.06 AS-BUILT DRAWINGS

- A. Furnish one set of as-built drawings to the A/E in conformance with the requirements of Division 1.
- B. As-built drawings shall show all buried piping and duct work, with dimensions given to permanent, easily identified building features.

- C. As-built drawings shall indicate locations of all valves, dampers, and other access points which are above ceilings or concealed in walls. Valve numbers shall be indicated on the As-Built Drawings.

3.07 OPERATING AND MAINTENANCE INSTRUCTIONS AND MANUALS

- A. Prepare three copies of an Operating and Maintenance Manual for all equipment provided under Division 23 inch (584.2 mm) accordance with Division 01.
- B. Contents:
 - 1. Operating and Maintenance Manuals shall include operating information, maintenance information, control information, parts lists, filter information when applicable, lubrication information and exploded view diagrams when applicable.
 - 2. Information shall be arranged in an orderly manner, generally in the sequence of the specifications.
 - 3. An index shall list the contents of each section of the manual, with index tabs matching the index. The index page shall list the name, address, and telephone number of the mechanical contractor. The index page of each section shall list the name, address, and telephone number of the contractor or subcontractor responsible for the products included in that section of the manual.
 - 4. The index page shall list the name, address, and telephone number of a 24-hour, seven-day emergency organization; either the contractor or a service organization authorized to represent the contractor.
 - 5. The temperature control section shall include information for control components, control diagrams, sequences of operation, and As-Built drawings of the controls. When applicable, the control section shall include point-to-point test lists and other testing, adjusting and calibration documentation.
 - 6. The manuals shall include Testing and Balancing Reports.
- C. Manuals shall be provided in high quality, three-ring binders. The outside of the binders shall be printed or stamped with the name of the project, the names of the Owner, Consulting Engineer, and Contractor, and the year the project was completed. The identification shall be permanently attached, contrasting color to the binder and sized appropriately. Plastic tape labels will not be considered permanent labels.
- D. Submit one preliminary copy of the manual for review by the A/E prior to assembling the final copies. This preliminary copy will be returned, and with any required additions and corrections, can be used as one of the final copies of the manual.
- E. Submit the final manuals before requesting final payment.

3.08 GUARANTEES AND WARRANTIES

- A. Submit written copies of all guarantees and warranties prior to requesting final payment.

3.09 COMPLETION OF WORK

- A. When requesting final inspection, give ten days' notice. Submit written certification that the work has been fully completed in strict accordance with plans and specifications.

3.10 INSPECTION

- A. Submit written certification of inspection from the governing building authority stating that all work has been inspected, accepted and approved as complying with existing governing ordinances and codes.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.
- C. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.
- D. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
- E. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 2024.
- F. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- H. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- I. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. Section Includes:
 - 1. Hanger rods.
 - 2. Formed steel channel.
 - 3. Seismic Cable Bracing.

1.03 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 - Test Method of Fire Tests of Through Penetration Firestops.
 - 4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
 - 5. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- B. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- C. FM Global:
 - 1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- D. Underwriters Laboratories Inc.:

1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Through-Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.

E. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

1.04 SUBMITTALS

A. Product Data:

1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

B. Manufacturer's Installation Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.06 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.07 WARRANTY

- A. Furnish one year manufacturer warranty for pipe hangers and supports.

PART 2 PRODUCTS

2.01 HANGER RODS:

- A. Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.02 FORMED STEEL CHANNEL

A. Manufacturers:

1. B-Line Systems
2. Unistrut Corp.

- B. Product Description: Galvanized 12 gage, thick steel. With holes 1-1/2 inches (38 mm) on center.

2.03 SEISMIC CABLE BRACING

A. Manufacturers:

1. Gripple Inc. Standard Hanger (HF)
2. Approved Substitute

B. Cable Bracing:

1. Seismic Cable Bracing Systems shall be specifically designed and engineered to brace and secure suspended nonstructural equipment (VAV boxes, fans, unit heaters, small in-line pumps, etc.) and components (HVAC duct, conduit/cable tray, and piping) within a building or structure to minimize damage from an earthquake or a seismic event.
2. Cable seismic bracing kits shall include a length of cable with pre-attached end fitting, color-coded tag, seismic fastener, and standard or retrofit bracket.
3. Housing: Type ZA2 zinc.
4. Wedge: Sintered steel hardened to min. 56 Rockwell C.
5. Spring - Stainless Steel (Type 302).
6. End Cap - No.1-4: UV stabilized homopolymer propylene; No.5: Type ZA2 Zinc.

PART 3 EXECUTION

3.01 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

1.02 SUMMARY

- A. Section Includes:
 - 1. Nameplates.
 - 2. Tags.
 - 3. Stencils.

1.03 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturers catalog literature for each product required.

1.05 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.06 QUALITY ASSURANCE

- A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

1.07 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.01 NAMEPLATES

- A. Manufacturers:
 - 1. Craftmark Identification Systems.
 - 2. Safety Sign Co..
 - 3. Seton Identification Products.
- B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.02 TAGS

- A. Plastic Tags:
 - 1. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches (38 mm) diameter.
- B. Metal Tags:
 - 1. Brass with stamped letters; tag size minimum 1-1/2 inches (38 mm) diameter with finished edges.

C. Information Tags:

1. Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches (143 mm) with grommet and self-locking nylon ties.

D. Tag Chart: Typewritten letter size list of applied tags and location plastic laminated.

2.03 STENCILS

A. Stencils: With clean cut symbols and letters of following size:

1. Up to 2 inches (50.8 mm) Outside Diameter of Insulation or Pipe: 1/2 inch (12.7 mm) high letters.
2. 2-1/2 to 6 inches (152.4 mm) Outside Diameter of Insulation or Pipe: 1-inch high letters.
3. Ductwork and Equipment: 1-3/4 inch (44 mm) high letters.

B. Stencil Paint: Semi-gloss enamel, colors and lettering size conforming to ASME A13.1, to match existing color code.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Identify air terminal units and radiator valves with numbered tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (609.6 cm) 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.
- K. Identify 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

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Testing adjusting, and balancing of air systems.
 - 2. Measurement of final operating condition of HVAC systems.
- B. Related Sections:
 - 1. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation for HVAC equipment.

1.02 REFERENCES

- A. Associated Air Balance Council:
 - 1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems.
- C. Natural Environmental Balancing Bureau:
 - 1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

1.03 SUBMITTALS

- A. Prior to commencing Work, submit proof of latest calibration date of each instrument.
- B. Test Reports: Indicate data on AABC MN-1 National Standards for Total System Balance forms
- C. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- D. Submit draft copies of report for review prior to final acceptance of Project.
- E. Furnish reports in PDF format, manuals, complete with table of contents 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.

1.04 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of balancing valves and rough setting.
- B. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with AABC MN-1 National Standards for Field Measurement and Instrumentation, Total System Balance.
- B. Maintain one copy of each document on site.
- C. Prior to commencing Work, calibrate each instrument to be used.

1.06 QUALIFICATIONS

- A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience certified by AABC

1.07 SEQUENCING

- A. Sequence balancing between completion of systems tested and Date of Substantial Completion.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify systems are complete and operable before commencing work. Verify the following:
 1. Systems are started and operating in 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.

3.02 PREPARATION

- A. Furnish instruments required for testing, adjusting, and balancing operations.

3.03 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.04 ADJUSTING

- A. Verify recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.

- D. Report defects and deficiencies noted during performance of services, preventing system balance.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in main 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.
- E. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
- F. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes to vary fan speed. 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 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. At modulating damper locations, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to obtain required relationship between each to maintain approximately 0.05 inches (1.27 mm) positive static pressure near building entries.

3.06 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
 - 1. Unit Ventilators.
 - 2. Fans.
 - 3. Air Inlets and Outlets.
- B. Report Forms
 - 1. Title Page:

- a. Name of Testing, Adjusting, and Balancing Agency
 - b. Address of Testing, Adjusting, and Balancing Agency
 - c. Telephone and facsimile numbers 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
2. Summary Comments:
- a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Summary of outdoor and exhaust flows to indicate building pressurization
 - e. Nomenclature used throughout report
 - f. Test conditions
3. Instrument List:
- a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Range
 - f. Calibration date
4. Electric Motors:
- a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP and kW
 - d. Phase, voltage, amperage; nameplate, actual, no load
 - e. RPM
 - f. Service factor
 - g. Starter size, rating, heater elements
 - h. Sheave Make/Size/Bore
5. Electric Duct Heater:

- a. Manufacturer
 - b. Identification/number
 - c. Location
 - d. Model number
 - e. Design kW
 - f. Number of stages
 - g. Phase, voltage, amperage
 - h. Test voltage (each phase)
 - i. Test amperage (each phase)
 - j. Air flow, specified and actual
 - k. Temperature rise, specified and actual
6. Exhaust Fan Data:
- a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Air flow, specified and actual
 - f. Total static pressure (total external), specified and actual
 - g. Inlet pressure
 - h. Discharge pressure
 - i. Sheave Make/Size/Bore
 - j. Number of Belts/Make/Size
 - k. Fan RPM

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- B. NEMA BS 31032 - Residential Controls—Electrical Wall-Mounted Room Thermostats; 2025.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

1.02 SUMMARY

- A. Section Includes:
 - 1. Thermostats.
 - 2. Motorized dampers.
 - 3. Damper actuators.
- B. Related Sections:
 - 1. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation implemented using products specified in this section.
 - 2. Section 23 33 00 - Air Duct Accessories: Product requirements for duct mounted thermometers.

1.03 REFERENCES

- A. Air Movement and Control Association International, Inc.:
 - 1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
- B. National Electrical Manufacturers Association:
 - 1. NEMA BS 31032 - Residential Controls - Electrical Wall Mounted Room Thermostats.
- C. National Fire Protection Association:
 - 1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

1.04 SUBMITTALS

- A. Product Data: Submit description and engineering data for each control system component. Include sizing as requested.

1.05 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors.
- B. Operation and Maintenance Data: Submit inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.06 QUALITY ASSURANCE

- A. Control Air Damper Performance: Test in accordance with AMCA 500.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept controls on site in original factory packaging Inspect for damage.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Furnish one year manufacturer warranty for each control system component.

1.10 MAINTENANCE SERVICE

PART 2 PRODUCTS

2.01 THERMOSTATS

- A. Programmable Commercial Thermostats:

1. Manufacturer:
 - a. Honeywell VSIONPro TB832R1003/U
2. Wall-mounted thermostat with seven-day programmable scheduling with two stages of heating and cooling.
3. Display with backlight showing the current and set temperature and time.
4. Menu-driven programming.
5. Switch positions: Heat-Off-Cool-Auto
6. Power method: 24 V AC or battery

2.02 MOTORIZED DAMPERS

- A. Manufacturers:

1. Ruskin Model CD-51.
2. Greenheck

- B. Fabrication:

1. Frame: 5 inches (127 mm) x 1 inch (25.4 mm) x minimum 0.125 inch (3.18 mm) 6063-T5 extruded aluminum hat-shaped channel, mounting flanges on both sides of frame, reinforced at corners.
 2. Blades:
 - a. Style: Flat, single-piece.
 - b. Action: Opposed.
 - c. Orientation: Horizontal.
 - d. Material: Minimum 0.125 inch (3.18 mm) extruded aluminum.
 - e. Width: Nominal 6 inches (152.4 mm)
 3. Bearings: Molded synthetic sleeve, turning in hole in frame.
 4. Seals:
 - a. Blade: Extruded neoprene edge type for low leakage. Mechanically attached to blade edge.
 - b. Jamb: Flexible metal compression type.
-

5. Linkage: Concealed in frame.
6. Axles: Minimum 1/2 inch (12.7 mm) diameter plated steel, hex-shaped, mechanically attached to blade.
7. Mounting: Horizontal.
8. Finish: Mill aluminum.

C. Performance Data:

1. Temperature Rating: Withstand -50 to 250 degrees Fahrenheit (121.11 degrees Celsius).
2. Capacity: Demonstrate capacity of damper to withstand HVAC system operating conditions.
3. Closed Position: Maximum pressure of 5 inches (127 mm) w.g. 0 psi (1.2 kPa).
4. Open Position: Maximum air velocity of 2,000 feet (60960 cm) per minute 667.1 yard (610 meter) /min).
5. Leakage: Maximum 3.2 cubic feet per minute per square foot (1.0 m³/min/m²) at 1 inch (25.4 mm) w.g. 0 psi (0.25 kPa) for all sizes 12 inches (304.8 mm) wide and above.
6. Pressure Drop: Maximum 0.07 inch (1.78 mm) w.g. 0 psi (0.02 kPa) at 1,500 feet (45720 cm) per minute 499.78 yard (457 meter) /min) across 24 inch x 24 inch (610 x 610 mm) damper.

2.03 DAMPER ACTUATORS

A. Manufacturers:

1. Belimo.

B. Operation: Modulating.

C. Enclosure Rating: NEMA EN 10250 Type 1 Enclosure.

D. Mounting: Direct mount.

E. Stroke: 90 seconds end to end full stroke, 15 seconds return to normal for spring return.

F. Protection: Electronic stall protection.

G. Control Input: 0-10 VDC or 0-20 mADC.

H. Power: Nominal 120 volt AC.

I. Torque: Size for minimum 150 percent of required duty.

J. Duty cycle: rated for 65,000 cycles.

K. Accessories:

1. Cover mounted transformer.
 2. Auxiliary potentiometer.
 3. Damper linkage.
 4. Direct drive feedback potentiometer.
 5. Output position feedback.
 6. Field selectable rotational, spring return direction, field adjustable zero and span.
-

7. End switch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify building systems to be controlled are ready to operate.
- B. Verify location of thermostats and other exposed control sensors with Drawings before installation.

3.02 INSTALLATION

- A. Install thermostats, space temperature sensors, and other exposed control sensors after locations are coordinated with other Work.
- B. Install thermostats, space temperature sensors, and other exposed control sensors 42 inches (1066.8 mm) above floor. Align with light switches.
- C. Install outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.
- D. Install guards on thermostats in public areas, gymnasiums and high security areas.
- E. Install control panels adjacent to associated equipment on vibration free walls or freestanding supports. Use one cabinet for more than one system in same equipment room. Install engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- F. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.
- G. Install conduit and electrical wiring in accordance with Section 26 05 19.

3.03 FIELD QUALITY CONTROL

- A. After completion of installation, test and adjust control equipment. Submit data showing set points and final adjustments of controls.

3.04 DEMONSTRATION AND TRAINING

- A. Demonstrate complete operation of systems, including sequence of operation prior to Date of Substantial Completion.
- B. Demonstrate complete and operating system to Owner.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes sequence of operation for:
 - 1. Unit heaters.
- B. Related Sections:
 - 1. Section 23 09 00 - Instrumentation and Control for HVAC: For equipment, devices, and system components to implement sequences of operation.

1.02 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and set points of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 UNIT HEATERS

- A. Single temperature room thermostat set at 68 degrees Fahrenheit (20 degrees Celsius) maintains constant space temperature by cycling unit fan motor and energizing electric heating elements.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for; 2025.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- 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; 2024.
- 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; 2014.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- H. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- I. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.
- J. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

1.02 SUMMARY

- A. Section Includes:
 - 1. Duct Materials.
 - 2. Transverse duct connection system.
 - 3. Ductwork fabrication.
 - 4. Duct cleaning.
- B. Related Sections:
 - 1. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for hangers, supports and sleeves for placement by this section.
 - 2. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.

1.03 REFERENCES

- A. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A90/A90M - Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

3. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 4. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
 5. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 6. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 7. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 8. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Fire Protection Association:
1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
 2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.
 3. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- C. Sheet Metal and Air Conditioning Contractors:
1. SMACNA - HVAC Air Duct Leakage Test Manual.
 2. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- D. Underwriters Laboratories Inc.:
1. UL 181 - Factory-Made Air Ducts and Connectors.

1.04 PERFORMANCE REQUIREMENTS

- A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

- A. Product Data: Submit data for duct materials, duct liner and duct connectors.

1.06 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.

- B. Construct ductwork to NFPA 90A and NFPA 90B and NFPA 96 standards.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealant.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Furnish one year manufacturer warranty for ducts.

PART 2 PRODUCTS

2.01 DUCT MATERIALS

- A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G90 zinc coating of in conformance with ASTM A90/A90M.
- B. Steel Ducts: ASTM A1008/A1008M, ASTM A1011/A1011M and ASTM A568/A568M.
- C. Aluminum Ducts: ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
- D. Stainless Steel Ducts: ASTM A167, Type 316.
- E. Fasteners: Rivets, bolts, or sheet metal screws.
- F. Hanger Rod: ASTM A36/A36M; steel; threaded both ends, threaded one end, or continuously threaded.

2.02 TRANSVERSE DUCT CONNECTION SYSTEM

- A. Manufacturers:
 - 1. Ductmate
- B. Product Description: SMACNA "F" rated rigidity class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards). Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

- E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch (101.6 mm) cemented slip joint, brazed or electric welded. Prime coat welded joints.
- F. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify sizes of equipment connections before fabricating transitions.

3.02 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible.
- B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8 inch (203.2 mm) and smaller.
- D. Use double nuts and lock washers on threaded rod supports.
- E. Connect flexible ducts to metal ducts with draw bands.
- F. Set plenum doors 6 to 12 inches (304.8 mm) above floor. Arrange door swing so fan static pressure holds door in closed position.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Install openings in ductwork where required to accommodate thermometers and controllers. Install pitot tube openings for testing of systems. Install pitot tube complete with metal can with spring device or screw to prevent air leakage. Where openings are provided in insulated ductwork, install insulation material inside metal ring.
- B. Connect air outlets and inlets to supply ducts directly or with five foot maximum length of flexible duct. Do not use flexible duct to change direction.

3.04 CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air flow, clean one half of system completely before proceeding to other half. Protect equipment with potential to be harmed by excessive dirt with temporary filters, or bypass during cleaning.
- B. Clean duct systems with high power vacuum machines. Protect equipment with potential to be harmed by excessive dirt with filters, or bypass during cleaning. Install access openings into ductwork for cleaning purposes.

3.05 SCHEDULES

- A. Ductwork Material Schedule:

AIR SYSTEM	MATERIAL
Supply (Heating Systems)	Steel
Supply (System with Cooling Coils)	Steel
Return and Relief	Steel

General Exhaust	Steel, Aluminum
Outside Air Intake	Steel

B. Ductwork Pressure Class Schedule:

AIR SYSTEM	PRESSURE CLASS
Constant Volume Supply	1 inch (25.4 mm) wg regardless of velocity.
Supply (Heating Systems)	1/2 inch (12.7 mm) wg
Supply (System with Cooling Coils)	1/2 inch wg
Return and Relief	1/2 inch wg regardless of velocity.
General Exhaust	1/2 inch wg regardless of velocity.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.
- C. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- D. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- E. UL 555C - Standard for Safety Ceiling Dampers; Current Edition, Including All Revisions.
- F. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. Section Includes:
 - 1. Back-draft dampers.
 - 2. Duct access doors.
 - 3. Volume control dampers.
 - 4. Flexible duct connections.
 - 5. Duct test holes.
- B. Related Sections:
 - 1. Section 23 09 00 - Instrumentation and Control for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
 - 2. Section 23 31 00 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.

1.03 REFERENCES

- A. Air Movement and Control Association International, Inc.:
 - 1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
- B. National Fire Protection Association:
 - 1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 92A - Recommended Practice for Smoke-Control Systems.
- C. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- D. Underwriters Laboratories Inc.:
 - 1. UL 555 - Standard for Safety for Fire Dampers.
 - 2. UL 555C - Standard for Safety for Ceiling Dampers.
 - 3. UL 555S - Standard for Safety for Smoke Dampers.

1.04 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data for shop fabricated assemblies and hardware used.
- C. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
 - 1. Backdraft dampers.
 - 2. Flexible duct connections.
 - 3. Volume control dampers.
 - 4. Duct access doors.
- D. Product Data: For fire dampers, smoke dampers, combination fire/smoke dampers, submit the following:
 - 1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
 - 2. Indicate materials, construction, dimensions, and installation details.
 - 3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
- E. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of access doors.
- B. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.

1.06 QUALITY ASSURANCE

- A. Dampers tested, rated and labeled in accordance with the latest UL requirements.
- B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.
- B. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- C. Storage: Store materials in a dry area indoor, protected from damage.
- D. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.09 COORDINATION

- A. Coordinate Work where appropriate with building control Work.

1.10 WARRANTY

- A. Furnish one (1) year manufacturer warranty for duct accessories.
- B. Include copy of the warranty certificate in Operations and Maintenance Manual.

PART 2 PRODUCTS

2.01 BACK-DRAFT DAMPERS

- A. Manufacturers:
 - 1. Greenheck WD
 - 2. Ruskin CMBD2
- B. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, galvanized 16 gage thick steel frame. Aluminum blades, maximum 6 inch (152.4 mm) width, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.02 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Milcor 3208 or 3210
 - 2. Elmdor
- B. Access Doors: Bonderized steel, 20-gage doors and 16-gage frames, with flush screw driver operated cam latch, fitted with concealed hinges, factory prime coated.
- C. Access panels shall be Milcor Style AT for acoustical tile, Style K with expanded metal wings for plaster, Style M for masonry, tile and drywall and style DW for gypsum board walls and ceilings.
- D. Access doors and panels in fire rated construction shall have UL 1-1/2 hour B label.

2.03 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Greenheck.
 - 2. Ruskin.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Splitter Dampers:
 - 1. Material: Same gage as duct to 24 inches (609.6 mm) size in both dimensions, and two gages heavier for sizes over 24 inches.
 - 2. Blade: Fabricate of single double thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 - 3. Operator: Minimum 1/4 inch (6.35 mm) diameter rod in self aligning, universal joint action, flanged bushing with set screw.
 - 4. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch (762 mm).

- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch (1828.8 mm). Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware.
- E. End Bearings: Except in round ductwork 12 inches (304.8 mm) and smaller, furnish end bearings. On multiple blade dampers, furnish oil-impregnated nylon or sintered bronze bearings. Furnish closed end bearings on ducts having pressure classification over 2 inches (50.8 mm) wg.
- F. Quadrants:
 - 1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches (762 mm) furnish regulator at both ends.
 - 4. Model ICS-385 Manufactured by Duro Dyne.

2.04 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
 - 1. Duro-Dyne, Model Durolon.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.
- C. Connector: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd.
 - 2. Net Fabric Width: Approximately 3 inches (76.2 mm) wide.
 - 3. Metal: 3 inch (76.2 mm) wide, 24 gage galvanized steel.

2.05 DUCT TEST HOLES

- A. Manufacturers:
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify ducts and equipment installation are ready for accessories.
- B. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.02 INSTALLATION

- A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards – Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
 - B. Install back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated on Drawings.
 - C. Access Doors: Install access doors at the following locations and as indicated on Drawings:
-

1. Spaced every 50 feet (1524 cm) of straight duct.
 2. Upstream of each elbow.
 3. Upstream of each reheat coil.
 4. Before and after each duct mounted filter.
 5. Before and after each duct mounted coil.
 6. Before and after each duct mounted fan.
 7. Before and after each automatic control damper.
 8. Before and after each combination fire and smoke damper.
 9. Downstream of each VAV box.
 10. Install at locations for cleaning kitchen exhaust ductwork in accordance with NFPA 96.
- D. Access Door Sizes: Install minimum 8 x 8 inch (203.2 mm) size for hand access, 18 x 18 inch size for shoulder access, and as indicated on Drawings. Review locations prior to fabrication.
- E. Install temporary duct test holes where indicated on Drawings and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AMCA 99 - Standards Handbook; 2010.
- B. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.
- C. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.
- D. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- E. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
- F. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.02 SUMMARY

- A. Section Includes:
 - 1. Propeller fans.
- B. Related Sections:
 - 1. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product requirements for resilient mountings and snubbers for fans for placement by this section.
 - 2. Section 23 07 00 - HVAC Insulation: Product requirements for power ventilators for placement by this section.
 - 3. Section 23 09 00 - Instrumentation and Control for HVAC: Product requirements for control components to interface with fans.
 - 4. Section 23 31 00 - HVAC Ducts and Casings: Product requirements for hangers for placement by this section.
 - 5. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.

1.03 REFERENCES

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
 - 2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- B. Air Movement and Control Association International, Inc.:
 - 1. AMCA 99 - Standards Handbook.
 - 2. AMCA 204 - Balance Quality and Vibration Levels for Fans.
 - 3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
 - 4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
 - 5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
- C. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.

- D. Underwriters Laboratories Inc.:
 - 1. UL 705 - Power Ventilators.

1.04 SUBMITTALS

- A. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Submit fan manufacturers instructions.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.06 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
- C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- D. Balance Quality: Conform to AMCA 204.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors, shafts, and bearings from weather and construction dust.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Furnish one year manufacturer's warranty for fans.

PART 2 PRODUCTS

2.01 PROPELLER FANS

- A. Manufacturers:
 - 1. Greenheck.
 - 2. Loren Cook.
 - 3. PennBarry
- B. Construction:
 - 1. Impeller: Shaped steel or steel reinforced aluminum blade with hubs, statically and dynamically balanced, locked to shaft, directly connected to motor.
 - 2. Frame: One piece, square steel with die formed venturi orifice, mounting flanges and supports, with baked enamel finish.
- C. Accessories:
 - 1. Back-draft Damper: Multiple blade with offset hinge pin, blades linked.

2. Outlet Damper: Multiple blade with offset hinge pin, blades linked, line voltage motor drive, power open, spring return.
3. Safety Screens: Expanded galvanized metal over inlet, motor, and drive; to comply with OSHA regulations.
4. Hood: Weather shield, to exclude rain and snow.
5. Fan speed controller.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof curbs are installed and dimensions are as shown on shop drawings.

3.02 INSTALLATION

- A. Provide backdraft dampers on outlet from cabinet and ceiling fans and as indicated on Drawings.
- B. Install safety screen where inlet or outlet is exposed.
- C. Install backdraft dampers on discharge of exhaust fans and as indicated on Drawings.

3.03 CLEANING

- A. Demonstrate fan operation and maintenance procedures.
- B. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

1.02 SUMMARY

- A. Section Includes:
 - 1. Louvers.
- B. Related Sections:
 - 1. Section 23 33 00 - Air Duct Accessories: Volume dampers for inlets and outlets.

1.03 REFERENCES

- A. Air Movement and Control Association International, Inc.:
 - 1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 70 - Method of Testing for Rating the Performance of Air Outlets and Inlets.
- C. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.04 SUBMITTALS

- A. Product Data: Submit sizes, finish, and type of mounting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- B. Test Reports: Rating of air outlet and inlet performance.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of air outlets and inlets.

1.06 QUALITY ASSURANCE

- A. Test and rate diffuser, register, and grille performance in accordance with ASHRAE 70.
- B. Test and rate louver performance in accordance with AMCA 500.

1.07 WARRANTY

- A. Furnish one year manufacturer warranty for air outlets and inlets.

PART 2 PRODUCTS

2.01 LOUVERS

- A. Manufacturers:
 - 1. Ruskin
 - 2. Greenheck
- B. Fabrication: Stationary drainable type.

1. Design: Drainable blades shall be contained within the frame with downspouts in jambs and mullions. Standard or flanged construction as scheduled or required.
 2. Frame:
 - a. Frame Depth: 6 inches (152.4 mm).
 - b. Wall Thickness: 0.125", nominal.
 - c. Material: 6063T6 extruded aluminum.
 3. Blades:
 - a. Style: Drainable. 35 degree angle on 4 inch (101.6 mm) centers.
 - b. Wall Thickness: 0.090", nominal.
 - c. Material: 6063T6 extruded aluminum.
- C. Performance Data:
1. Based on testing 48 inch (1219.2 mm) x 48 inch size unit in accordance with AMCA 500.
 2. Free Area: 62 percent, nominal.
 3. Free Area Size: 9.95 sq feet (0.01071 sq cm).
 4. Maximum Recommended Air Flow Through Free Area: 1,200 feet (36576 cm) per minute.
 5. Air Flow: 11,940 cubic feet per minute.
 6. Maximum Pressure Drop (Intake): 0.15 inches (3.81 mm) w.g..
- D. Louvers shall be factory engineered to withstand the specified seismic loads.
1. Minimum design loads shall be calculated to comply with ASCE 7, or local requirements of Authority Having Jurisdiction (AHJ).

2.02 ACCESSORIES

- A. Insulated Blank-Off Panels: 20 gage galvanized steel sheet, 1 inch (25.4 mm) galvanized steel skin insulated core, factory installed with removable fasteners and neoprene gaskets.
- B. Bird Screen:
 1. Galvanized Steel: 1/2 inch (12.7 mm) by 19 gage.
 2. Frame: Removable.
 3. Finish: Mill finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify inlet and outlet locations.
- B. Verify ceiling and wall systems are ready for installation.

3.02 INSTALLATION

- A. Install balancing dampers on duct take-off to diffusers, grilles, and registers, whether or not dampers are furnished as part of diffuser, grille, and register assembly.
- B. Paint visible portion of ductwork behind air outlets and inlets matte black.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Electric Unit Heaters

1.02 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.

1.03 SUBMITTALS

- A. Product Data: Submit rated capacities, efficiencies, weights, required clearances, and location and size of field connections, accessories, electrical nameplate data, and wiring diagrams.

1.04 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and connections.
- B. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, service instructions, installation instructions, maintenance and repair data, and parts listing.

PART 2 PRODUCTS

2.01 ELECTRIC UNIT HEATERS

- A. Manufacturers:
 - 1. King
 - 2. Q-Mark
- B. Unit heaters shall be electric coil horizontal blow type, size and capacity as scheduled, with propeller fan and integral adjustable thermostat.
- C. Heaters shall be completely factory wired and assembled, with all required electrical power devices and accessories, including automatic re-setting overheat control, contactors, fuses, transformer, and terminal blocks.
- D. Unit shall be UL approved.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify building is ready for installation of units and openings are as indicated on Drawings.

3.02 INSTALLATION

- A. Mount unit heaters from existing unistrut supports where possible. Where existing supports are not adequate, provide additional unistrut support as required to secure mounting of unit heaters.
- B. Reconnect existing electrical power circuits to new unit heaters following installation.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

1.02 SUMMARY OF WORK

- A. The extent and location of "Electrical Work" Work is shown in the Contract Documents. This Section includes general requirements for accomplishing electrical Work as specified herein and indicated on the Drawings.
- B. Electrical hot Work may be required to be performed on portions of the electrical power distribution and utilization equipment. The Contractor and its subcontractors shall provide personal protection equipment (PPE), training, authority having jurisdiction (AHJ) safety compliance and all necessary tools for the execution of such Work.
- C. Electrical Primary civil (trench, conduit, and vaults) system, and secondaries shall be installed by a qualified electrical contractor licensed in the state of Washington under RCE 19.28.
- D. Contractor shall provide all labor and materials for a complete electrical system.
- E. Contractor shall provide all labor and materials to install owner furnished equipment.
- F. Contractor shall purchase and obtain all required electrical and mechanical permits.
- G. Contractor shall coordinate all required power outages with the owner and Tacoma Public Utilities.

1.03 GOVERNING CODES, STANDARDS AND REFERENCES

- A. FAA (Federal Aviation Administration)
- B. NFPA 70: National Electrical Code (NEC)
- C. NFPA 70 E: Standard for Electrical Safety in the Workplace
- D. Tacoma Public Utilities
- E. State of Washington Dept. of Labor & Industries.
- F. Underwriters Laboratories, Inc.
- G. WAC 296-45
- H. State requirements for highway signage, flagging, and re-routing traffic
- I. State of Washington safety rules and health standards

1.04 SUBMITTALS

- A. Submit materials data in accordance with Section 01 33 00 – Submittals Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions.
- B. Submittals shall include the following:

1. Review of Shop Drawings and Brochures shall not relieve the Contractor of responsibility for dimensions and/or errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the noting of some errors, but the overlooking of others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the review of the Shop Drawings and Brochures.
 2. Manufacturer Approval Drawings: Equipment that is laid out, configured, or designed by manufacturer based on performance specifications only shall be submitted to the Engineer for approval prior to release of drawings for manufacturing.
- C. Ordering Materials: Order materials within two (2) weeks of receiving approved submittals from the Engineer. Provide proof of order placement upon request. Failure to comply will be considered non-performance and progress payments will be suspended until proof of order placement is reviewed and accepted by the Engineer.

1.05 DRAWINGS

- A. The electrical drawings are diagrammatic and are not intended to show all raceway, wiring, exact locations of equipment, terminations, or number or types of fittings required by the electrical system. Provide all related electrical Work which is specified herein, diagrammed or scheduled on the electrical drawings, required by code enforcing agencies and as indicated on other details or elevations for complete and operating electrical systems. Since the drawings of floor, wall, and ceiling installation are made at a small scale, outlets, devices, equipment, etc. are indicated only in their approximate location unless dimensioned or otherwise indicated. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned and coordinate such locations with the Work of other trades to prevent interferences. Verify all dimensions on the job. Do not scale the electrical drawings.

1.06 PRODUCTS

- A. General: Products are specified by manufacturer name, description, and/or catalog number to show intended function and quality. Report discrepancies, such as discontinued equipment or catalog numbers, to the Engineer prior to bidding. If the Contractor is unable to interpret any part of the plans and/or specifications, he shall notify the Engineer, who will issue interpretation and/or additional clarifications to Bidders before the project is bid.
- B. Manufacturers: Provide only equipment specified in the Contract Documents or approved by addendum. Manufacturers' catalog numbers and descriptions establish the quality of product required.
- C. Warranty: Warranty shall be manufacturer's standard or a minimum of one year unless noted otherwise in Division 26 Electrical Sections.

1.07 SUBSTITUTIONS

- A. Substitutions of specified materials are not allowed without prior approval.

1.08 QUALITY ASSURANCE

- A. All materials shall be new, unless noted otherwise. Properly store all materials and equipment for protection from physical damage or damage due to corrosion.
- B. Review accessibility of equipment for operation, maintenance and repair prior to installation. Proceed with installation only after unsatisfactory conditions have been corrected

- C. Equipment Manufacturer Qualifications: Equipment manufacturers shall have at least 10 years experience in manufacturing products and accessories similar to those for this Project, with a record of successful in-service performance.

1.09 COORDINATION AND SCHEDULING

- A. Coordinate and schedule electrical Work with the Work of other trades. Every reasonable effort shall be made to prevent conflicts as to space requirements, dimensions, locations, code required working spaces, access openings, drawout and removal spaces or other matters tending to obstruct or delay the Work of other trades. All changes caused by failure to coordinate shall be made at the Contractor's expense.

1.10 SAFETY AND PROTECTION

- A. Safety Measures To Be Taken: The Engineer has not been retained or compensated to provide design and construction review services relating to the Contractor's safety precautions or to the means, methods, techniques, sequences or procedures required for the Contractor to perform his Work. The Contractor will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours. The duty of the Engineer to conduct construction observations of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site. It shall be the Contractor's responsibility to comply with applicable safety and health regulations for construction. The Contractor shall consult with the state or federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist or whether they are or are not in compliance with state or federal regulations.
- B. Protection: The Contractor shall take whatever measures are required to ensure that electrical safety and protection are maintained, including the proper covering, signage, and securing of "live" circuits.
- C. Project "Electrical Safety Rules" are as follows:
 - 1. Work on Electrical circuits operating at over 50 volts, phase to ground, or greater shall be conducted in accordance with acceptable industry safety standards.
 - 2. Power Outages: Any essential outages required in the course of construction, whether for temporary services, cutovers, or testing, shall be closely coordinated with the Engineer and shall occur at times approved by the Port by means of shutdown notification request. Contractor shall identify all systems affected and provide copy of panel schedules of panelboards affected by shutdown notification request.
 - 3. Electrical circuits operating at over 300 volts phase to ground, or circuits serviced by a transformer over 150 kVA, shall be de-energized before proceeding with the Work.
 - 4. Electrical circuits shall be considered de-energized only after compliance with Lock-out Tag-out procedures and under the following conditions:
 - a. Switches connecting subject circuit to the energy supply are observed in the "open" position, with an air break, and locked and tagged out in accordance with Lock-out Tag-out procedures.
 - b. Electrically operated switches are visibly "open", blocked or racked in the "open" position, and locked and tagged out "open".

- c. If the supply circuit break is not visible and clearly identified, the circuit shall be grounded. If the ground connection is not within sight of the Work area, the ground connection shall be locked and tagged out before proceeding with the Work.
 - d. Oil switches are observed "open" in a sight window and locked and tagged out "open," or fuse carrier is removed in oil fuse cutouts and locked and tagged out "open."
5. Use of Red Safety Tags
- a. For protection of personnel working on circuits, safety tags shall be filled out and attached to any opened switch or equipment.
 - b. Safety tags shall be removed only by the Port of Tacoma employee who placed the tag, or by another Port of Tacoma employee who has been authorized to remove the tag in writing by the employee who placed the tag. The Port of Tacoma Maintenance Electrical Systems Manager or his designated representative may authorize removal of a safety tag placed by an employee who is not available to remove the tag at the time of need only after carefully checking that the circuit is ready to be energized.
 - c. Equipment with a safety tag attached shall not be operated, and connections with a safety tag attached shall not be changed.
6. Insulated cables, operated at over 300 volts to ground, shall be handled when energized only with rubber gloves tested to 22,000 volts by a Washington State approved testing laboratory.
7. Insulated cables that have been in operation shall be cut only with grounded cable shears, or shall be grounded by driving a grounded sharp tool through the shielding and the conductors before cutting.
8. All personnel working around energized electrical equipment shall comply with NFPA 70 E per equipment labels. If no label is present personnel shall wear standard insulated, non-conducting hard hats and shall wear fire retardant garments with no metallic zipper fasteners.
9. Ladders used in any electrical Work shall be of wood or fiberglass construction.
10. All panelboards, junction boxes, electrical devices and other similar equipment which is being worked on and which have exposed live wires, bus bars, or terminals operating above 50 volts shall be covered adequately for the voltage with an electrical insulating material and labeled with a "Caution" sign when Contractor personnel are not present. The Caution sign shall advise that exposed electrical parts are behind the temporary protective cover.
11. Contractors engaged on Port of Tacoma projects or working on Port of Tacoma property shall be governed by Port of Tacoma rules. The Contractor shall place their lock and tag only after Port of Tacoma Electric Shop or designee has placed a lock and tag. The Contractor shall designate a supervisor for all contract personnel and operations. This supervisor shall be on the job whenever contract operations are in progress.
- D. Comply with the following procedures for medium-voltage manhole access:
- 1. All switching of the medium-voltage system must be approved in advance and coordinated through the Electrical Shop.
 - 2. Schedule requests for Electrical Shop assistance a minimum of seven (7) days in advance.

3. Comply with Port of Tacoma Construction Confined Space Entry Requirements, lock and tag out procedures, and all other applicable State safety requirements.
 4. Complete a confined space entry permit for each entry. Submit to the Engineer.
 5. Ventilate and monitor the confined space. A top man is required at all times.
 6. Complete lock and tag out once line clearance has been given, and attach locks and tags to any opened switch or equipment. Submit tags to Electrical Shop upon completion of the Work.
 7. Provide effective barriers to prevent others from falling into the open vault. Close and secure vaults when not attended.
 8. Comply with Port of Tacoma and State requirements for highway signage, flagging, and re-routing traffic.
- E. Before entry is made into energized electrical cable vaults or manholes, an infrared tester shall be used to scan the cables and connector components. If a temperature difference of 10 degrees Fahrenheit is detected between the cable and connector components, or any reading greater than 140 degrees Fahrenheit is detected from the cables or components the entry shall not be made! The Contractor shall notify the Engineer.

1.11 ELECTRICAL SERVICE

- A. Continuity of Service: Provide temporary service to existing systems as required to maintain continuous operation without reducing equipment efficiency. Coordinate the extent of temporary services with the Engineer.
- B. Power Outages: Outages shall be kept to an absolute minimum. Any essential outages required in the course of construction, whether for temporary services, cutovers, or testing, shall be closely coordinated with the Engineer and shall occur at times approved by the Port of Tacoma.

1.12 DEMOLITION

- A. General: De-energize circuits in demolition areas to ensure a safe condition.
- B. Existing material that is not to be reused or is not requested by the Port to be retained shall be removed from the site and shall become the property of the Contractor for salvage. All materials removed from the site shall be disposed of at facilities licensed for the material.
- C. In areas of where alterations are to be done, existing conduits may be reused, with the approval of the Engineer, in their original location, unless noted otherwise.
 1. Wiring that is discovered with damaged or deteriorating insulation shall be replaced with new.
 2. No existing conduit or wiring once removed may be reused, unless noted otherwise.
- D. Remove all unused exposed conduit except where located in or above existing construction, which is not being altered and would require removal and replacement of the existing construction.

1.13 ELECTRICAL EQUIPMENT INSTALLATION

- A. Comply with Division 1 General Requirements Sections for environmental regulatory requirements, quality control, construction facilities and temporary controls, traffic control, access control, and signage requirements.

- B. Provide electrical connection of all owner and contractor furnished equipment having electrical requirements. Make final connections for all equipment. Refer to Division 26 Electrical for motor starters and controls furnished integrally with equipment.
 - 1. Make electrical connections in accordance with manufacturer's written instructions, with recognized industry practices, and complying with requirements of the National Electrical Code.
 - 2. Verify all electrical loads (voltage, phase, full load amperes, number and point of connections, minimum circuit capacity, etc.) for equipment furnished under other divisions of this specification by reviewing respective shop drawings furnished under each division.
 - 3. Meet with each subcontractor furnishing equipment requiring electrical service to review electrical characteristics for each equipment item before rough-in begins. Report any variances from electrical characteristics noted on the electrical drawings to the Engineer before proceeding with rough-in Work.
- C. National Electrical Code Compliance: Comply with applicable portions of National Electrical Code as to the type of products used and provisions for electrical power connections.
- D. Underwriters Laboratories acceptance: All material and equipment within the scope of the UL Re-examination service shall be approved by Underwriters Laboratories, Inc. for the purpose for which they are used and shall bear their label.
- E. Cutting and Patching: Provide and coordinate the locations of all openings required in the building construction for installation of the Work.
 - 1. Drill penetrations required through existing concrete slabs or walls with a diamond core drill. In no case shall any structural member be cut.
 - 2. Provide approved sleeves as required for electrical penetrations through floors and walls. Seal all openings around conduits in sleeves with a material of equal fire rating as the surface penetrated.
 - 3. Obtain written approval from a Structural Engineer licensed in the State of Washington prior to cutting any reinforcing bars.
 - 4. Provide weekly updated Submittal Log of all penetrations and cuts performed.
- F. Equipment Bases and Fastening: Comply with seismic anchorage and bracing requirements for equipment and equipment racks.
- G. Equipment Accessibility: Comply with applicable codes and install equipment to be accessible for operation, maintenance or repair. Equipment deemed inaccessible shall be reported to the Engineer, and relocated as directed.
- H. Electrical Work Exposed to Weather: Provide weatherproof enclosures and corrosion protection for all ferrous metal portions of electrical Work exposed to weather, including conduit, clamps, supports, and hardware.
 - 1. All galvanized electrical equipment exposed to the weather shall be painted to prevent leaching of zinc into the stormwater system. Paint coating shall be a minimum of 3 mils (0.0762 mm) thick, and application as part of the manufacturing process is preferred over painting in the field.

1.14 EARTHWORK

- A. Existing Underground Utilities: Verify, before any excavation, the location of all existing utilities in the area of new construction. Exercise extreme care with all Work adjacent to these utilities. A designated representative of the Contractor shall advise the Port of Tacoma Electrical Supervisor and Power Company where they can be contacted in any emergency.
 - 1. Review drawings and notify the Engineer of any deviations in duct runs to avoid conflicts with existing utilities. Any changes in the Work resulting in the same quantities of trenching material shall not entitle the Contractor to any claim for an addition to this Contract.
 - 2. The Contractor is responsible for any damage done to existing utility installations during the course of the Work. All damaged installations shall be replaced to the satisfaction of the utility or agency involved at the expense of the Contractor.
- B. Comply with the Division 1 General Requirements and Division 31 Earthwork requirements for site work, including excavation, bracing and shoring, erosion control, requirements for temporary pumping equipment, backfilling, patching and paving, sod replacement, removal of surplus material, and requirements for traffic control during construction.

1.15 PROJECT FINALIZATION

- A. Fully test and adjust all equipment installed under this specification and demonstrate its proper operation.
 - 1. Testing that involves use of instruments other than meggers and volt-ohm meters shall be performed by an independent testing agency.
- B. Where circuits have been added, removed or relocated on panelboards and switchboards, the Contractor shall provide to the Port as-built panel and switchboard schedules in Port standard excel format. Coordinate submittal of schedules with Port Construction Manager.
- C. Present the Port with Certificate of Inspection from the Authorities Having Jurisdiction upon completion of the Work stating that all Work complies with all applicable Codes and Ordinances.
- D. Comply with Division 1 General Requirements for cleaning, closeout procedures, commissioning, training, operations and maintenance manuals, and record drawings.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDED

- A. Formatting manual submittals
- B. Compiling product data and related information appropriate for owners maintenance and operation.
 - 1. Modifying data as required to accurately represent completed installations.
 - 2. Obtain and Include Owner Furnished Equipment Data in O& M for a complete package.
- C. Instructing Owners personnel in maintenance, equipment, and systems operations prior to Owners acceptance of any portion or stage of the work.
- D. For additional data requirements see respective specification sections.

1.02 RELATED SECTIONS

- A. Coordinate related requirements specified in other parts of the Project Manual, including but not limited to the following:
 - 1. Division 26 - Electrical

1.03 FORM OF SUBMITTALS

- A. Prepare data in instructional manual form for use by owner's personnel.
- B. Format:
 - 1. Size: 8-1/2 X 11 inches (279.4 mm)
 - 2. Paper: 20 lb. minimum; white for typed pages
 - 3. Tests: Manufacturers printed data or neatly type written information on 20lb paper.
 - 4. Drawings:
 - a. Provide reinforced punched binder tab, bound in with text.
 - b. Fold oversized drawings and place in pocket glued to inside of back cover.
 - 5. Arrange content by systems, under section numbers and sequence of table of contents is Project Manual.
 - 6. Provide flyleaf for project and major component parts of equipment followed by typed descriptions. Provide indexed tabs.
 - 7. Cover: Identify each volume with typed or printed title: "Operation and Maintenance Instructions". Identify the following:
 - a. Title of project, names of Owner, Engineer, Contractor, Subcontractor, subject matter and completion date of Contract.
 - b. Identify general subject matter included in the Manual.
- C. Binder:
 - 1. Commercial quality, 8-1/2 x 11 inch (279.4 mm), 3 ring binder with durable hardback and cleanable plastic covers
 - 2. Maximum ring size: As suitable to content, 3 inch (76.2 mm) maximum.

3. When multiple binders are used, correlate data into related groupings.

1.04 CONTENTS OF MANUALS

- A. Neatly typewritten table of contents: Arrange systematically in relation to Project Manual Table of Contents. Include following information:
 1. Project title
 2. Engineer
 3. Contractor - name of responsible principal, address and telephone.
 4. An indexed list of each product and system data sheets.
 5. Show for each product the name, address and telephone number of the responsible.
 - a. Subcontractor or installer
 - b. Maintenance contractor, as applicable
 6. Maintenance contractor, as applicable
 7. Clearly identify by name and other symbols products and component parts as set forth in the Contract Documents.
- B. Product data:
 1. Submit original product literature only. Copies are not acceptable.
 2. Include only sheets pertinent to specific product.
 3. Annotate each sheet to:
 - a. Clearly identify specific product or part installed.
 - b. Clearly identify data applicable to installation
 - c. Delete inapplicable information.
 4. Coordinate identification of equipment to match the construction documents.
- C. Drawings:
 1. Supplement product data with Drawings required to clearly illustrate
 - a. Control and flow diagrams.
 - b. Relations of component parts of equipment systems.
- D. Supplement product and installation data with service schedule.
 1. Organize in consistent format under separate headings for different service procedures.
 2. Instances that might affect validity of warranties and bonds.
- E. Provide a copy of each warranty, bond and service contract issued.
 1. Provide information sheet for Owners personnel. Indicate:
 - a. Proper procedures in event of failure.
 - b. Instances that might affect validity of warranties and bonds.

1.05 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each item of equipment and each system: Include description of unit or system and component parts. Give function, normal operating characteristics and limiting conditions. Include performance curves with engineering data and tests. Include complete nomenclature and commercial number of replaceable parts.
- B. Panelboard circuit directories: Provide electrical service characteristics, controls and communications.
- C. Include "as-installed color-coded" wiring diagrams.
- D. Operating procedures: Include start up, break in and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown and emergency instructions. Include summer/winter, and any special operating instructions.
- E. Maintenance requirements: Include routine procedures and guide for trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing and checking instructions or complete replacement, as required.
- F. Provide servicing and lubrication schedule. List lubricants required.
- G. Include manufacturers printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturers parts list, illustrations, assembly drawings and diagrams required for maintenance.
- J. Provide as installed control diagrams by controls manufacturer.
- K. Provide list of original manufacturers spare parts, current prices and recommended quantities to be maintained in storage.
- L. Additional requirements: As specified in individual specifications section.
- M. Provide a listing in the Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owners designated personnel in operation, adjustment and maintenance of products, equipment and systems at agreed upon time. Demonstrate for equipment requiring particular seasonal operation. Perform instructions for other seasons within 6 months.

1.07 SUBMITTALS

- A. Submit one copy of completed volumes in final form 45 days prior to final inspection. A copy will be returned after final inspection with Construction Managers and Engineers comments. Revise content of documents as required before final submittal.
- B. Submit five copies of revised volumes of data in final form within 10 days after final inspection.

1.08 PREVENTATIVE MAINTENANCE INSTRUCTIONS

- A. Prepare preventative maintenance instructions. Include for each piece of equipment or system furnished, requiring periodic inspections, lubrication, adjustment and the like. Insure optimum and continued performance as originally specified.
 - 1. Preventative maintenance instructions: Prepare on form acceptable to Owner.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- B. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
- C. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013 (Reaffirmed 2020).
- D. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).
- E. NFPA 79 - Electrical Standard for Industrial Machinery; 2021.
- F. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- G. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- H. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- I. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
- J. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- M. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- N. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- O. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

1.02 WORK INCLUDED

- A. Raceways
- B. Wires and cables
- C. Boxes
- D. Wiring devices
- E. Supporting devices
- F. Electrical identification

PART 2 - PRODUCTS

2.01 RACEWAYS

- A. Rigid metal conduit and fittings (ferrous):
 - 1. Galvanized rigid steel conduit: UL 6; thick wall steel, hot-dip galvanized, threaded.
 - 2. Fittings and conduit bodies: UL 514B; threaded type, galvanized, material to match conduit.

- B. Flexible metal conduit and fittings:
 - 1. Flexible metal conduit: UL 1; galvanized steel.
 - 2. Liquidtight flexible metal conduit: UL 360; flexible metal conduit with copper bonding tape and PVC weatherproof jacket.
 - 3. Fittings: UL 514B; galvanized steel, insulated throat.
- C. Rigid nonmetallic conduit:
 - 1. Conduit: UL 651; schedule 80 PVC.
 - 2. Fittings and conduit bodies: UL 514B.
- D. Wireway and auxiliary gutters:
 - 1. UL 870; lay-in type, no knockouts, hinged cover, NEMA 4X stainless Steel unless otherwise indicated on Drawings.
 - 2. Size: 10 x 10-inch minimum.
 - 3. Hinges: Stainless steel
 - 4. Captive Bolts and hardware: Stainless Steel

2.02 BOXES

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover and threaded hubs.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Device Box Dimensions: 4 inches (101.6 mm) square by 2-1/8 inches (54 mm) deep
- F. Outdoor device Boxes: Cast construction, gasketed cover, threaded hubs, internal grounding screw, deep type for depth unless otherwise indicated or required for installation.

2.03 WIRE AND CABLE

- A. Rubber-insulated building wire:
 - 1. Exterior feeders and branch circuits: UL 44; copper, stranded conductor, 600 volt insulation, type XHHW.
- B. Wiring connections and splices:
 - 1. Use UL listed compression type connectors with insulating covers for copper wire splices and taps.
 - 2. For 8 AWG and smaller, use insulated spring connectors with plastic caps; 3M Scotchlok, or equal.
 - 3. For 6 AWG and larger, use UL listed compression type in-line splices. Insulate splice to 150% of conductor insulation value.

2.04 WIRING DEVICES

- A. General: Specification grade and UL listed.

- B. Receptacles: UL 498 and NEMA WD 1 Standard NEMA configurations as shown on Drawings. See attached cross reference for approved manufacturers and receptacle numbers.
- C. Provide wet location rated "While In Use" covers for outdoor device boxes.

2.05 SUPPORTING DEVICES

- A. Adequate for weight of equipment and conduit, including wiring, which they carry.
- B. Conform to seismic requirements of the Current Uniform Building Code .
- C. Conduit clamps, straps, and supports: Stainless Steel
- D. Screw/bolt retained clamp, spring steel clips and clamps are not acceptable.
- E. Support channel: Stainless Steel, 12 gauge, Uprights back-to-back 1-5/8 x 1-5/8- inch minimum size configuration, laterals 1-5/8 x 1-5/8-inch minimum size.
- F. Hardware: Stainless Steel.

2.06 ELECTRICAL IDENTIFICATION

- A. Nameplates: Engraved metal or phenolic with 1/4-inch white letters on black background.
- B. Labels: Embossed adhesive tape, 3/8-inch, white letters on black background.
- C. Wire and cable markers: Cloth markers, split sleeve or tubing type.
- D. Control panel wire markers: Heat shrink tubular type, machine embossed lettering, black letters on white background.

PART 3 - EXECUTION

3.01 RACEWAY INSTALLATION

- A. Size raceway as shown on the Drawings.
- B. Arrange raceway to maintain headroom and present a neat appearance. Headroom to be 7'-0" minimum unless otherwise shown on Drawings.
- C. Route exposed raceway parallel and perpendicular to walls and adjacent piping. In finished spaces, install EMT and conduit concealed in walls and ceiling.
- D. Maintain minimum 6-inch clearance between raceway and piping. Maintain 12 inch (304.8 mm) clearance between raceway and heat sources such as flues, steam pipes, and heating appliances.
- E. Arrange raceway supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using lay-in adjustable hangers, clevis hangers, or bolted split stamped stainless steel hangers.
- F. Group raceway in parallel runs where practical and use rack constructed of steel support channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- G. Do not fasten raceway with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- H. Where raceways enter/exit floor, provide threaded coupling with upper end flush with finished floor. Install threaded plugs in unused conduits.
- I. Use hydraulic one-shot conduit bender or factory elbows for bends in raceway larger than 1-1/4 inch (32 mm) size.

- J. Use suitable caps to protect installed raceway against entrance of dirt and moisture.
- K. Provide #10 steel wire or 1/4-inch poly rope pull string in all power and data/communication raceways, except sleeves and nipples.
- L. Seal between raceway and building where raceway passes through exterior wall or rated firewall. All compounds must be UL listed for the application.

3.02 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on the Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on the Drawings are approximate unless dimensioned. Verify location of outlets in offices and work areas prior to rough-in.
- C. Locate and install to maintain headroom and to present a neat appearance. Headroom to be 7-foot minimum unless otherwise shown on Drawings.
- D. Do not install outlet boxes back-to-back in walls, provide 16-inch minimum separation.
- E. Utilize multiple gang boxes; sectional boxes are not acceptable.

3.03 SUPPORTING DEVICES

- A. Fasten hanger rods, conduit clamps, outlets, and junction boxes to equipment support structure using approved stainless steel bolts and clamps.
- B. Do not use powder-actuated anchors. Do not drill, cut, or weld building structural steel members.
- C. Fabricate supports from stainless steel support channel; rigidly welded or bolted to present a neat appearance. Provide polymer channel endcaps for ends of channel.
- D. Install surface mounted cabinets, enclosures, and panels with a minimum of four anchors. Provide stainless steel channel supports and provide minimum 1/4-inch gap between wall and equipment.

3.04 MOUNTING HEIGHTS AND ORIENTATION

- A. Outdoor areas: mount receptacles at 48 inches (1219.2 mm) above finished floor unless otherwise noted.
- B. Mount 120V straight blade receptacles with ground blade at bottom.

3.05 GENERAL WIRING METHODS

- A. Use minimum #12 AWG for power and lighting circuits, and minimum #14 AWG for control wiring, unless otherwise noted on the Drawings.
- B. Comply with NFPA 79 for all wiring in industrial control panels.
- C. Do not splice feeder conductors, unless otherwise noted on the Drawings.

3.06 FIELD QUALITY CONTROL

- A. Perform continuity test and insulation resistance test on all power and equipment branch circuit conductors. Verify proper phasing connections. Test both new and modified circuits with a 1,000V megger.

3.07 CIRCUIT IDENTIFICATION

- A. Degrease and clean surfaces to receive nameplates and labels.
- B. Provide nameplates on all panelboards, control panels, and all exterior equipment and devices.
- C. Secure nameplates to equipment using stainless steel drive screws or rivets. Adhesives are not acceptable.
- D. Install labels (embossed tape) on other interior boxes and devices.
- E. Include power source on all nameplates and labels. (e.g. - "MDB-1/2a" for circuit 2a from panel MDB-1).
- F. Provide wire markers on each conductor in panelboards, pull boxes, outlets and junction boxes, and at all load connections. Identify with branch circuit or feeder number as indicated on Drawings. For control wiring, identify with wire number indicated on the schematic or interconnection diagrams.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Building wire
- B. Cable
- C. Wiring connections and terminations

1.02 RELATED SECTIONS

- A. Electrical Testing

1.03 REFERENCED STANDARDS

- A. NEMA WC 3 Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
- B. NEMA WC 7 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

1.04 SUBMITTALS

- A. Submit Shop Drawings and product data under the provisions of Section 01 33 00 – Submittal Procedures.

PART 2 - PRODUCTS

2.01 BUILDING WIRE

- A. Rubber-insulated building wire: NEMA WC 3.
- B. Feeders and branch circuits outdoors, underground #12 and larger: Copper stranded, conductor, 600 volt insulation, XHHW-2 stranded copper wire.
- C. Control circuit conductors in control panels type MTW stranded copper minimum size #14.
- D. Control circuit conductors in switchgear type SIS stranded copper.

PART 3 - EXECUTION

3.01 GENERAL WIRING METHODS

- A. Use wire no smaller than 12 AWG for power and lighting circuits, and wire no smaller than 14 AWG for control wiring.
- B. Use 10 AWG conductor for 20-ampere, 120-volt branch circuit home runs longer than 125 feet (3810 cm), and for 20-ampere, 277-volt branch circuit home runs longer than 200 feet (6096 cm).
- C. Place an equal number of conductors for each phase of a circuit in the same raceway or cable.
- D. Splice only in junction or outlet boxes.
- E. Neatly train and lace wiring inside boxes, equipment, and panel boards.
- F. Use equal conductor lengths for parallel circuits.

3.02 WIRING INSTALLATION IN RACEWAY

- A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 6 AWG and larger wires.

- B. Install wire in raceway after interior of building has been protected from the weather and mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.

3.03 CABLE INSTALLATION

- A. Provide protection for exposed cables where subject to damage.
- B. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal slips or plastic cable ties to support cables from structure or ceiling suspension system. Include bridle rings or drive rings.
- C. Use suitable cable fittings and connectors.

3.04 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.
- C. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150% of the insulation value of conductor.
- D. Thoroughly clean wires before installing lugs and connectors.
- E. Make splices, taps and terminations to carry full capacity of conductors without perceptible temperature rise.
- F. Terminate spare conductors with electrical tape.

3.05 FIELD QUALITY CONTROL

- A. Field Inspection and Testing shall be performed as specified in section 26 08 01 Electrical Testing
- B. Inspect wire and cable for physical damage and proper connection.
- C. Provide Low Voltage Electrical Power Cable Insulation Test
- D. Torque test conductor connections and terminations to manufacturer's recommended values.
- E. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.
- B. IEEE C2 - National Electrical Safety Code; 2012.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 780 - Standard for the Installation of Lightning Protection Systems; 2026.
- E. UL 96 - Lightning Protection Components; Current Edition, Including All Revisions.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.02 SUMMARY OF WORK

- A. The extent and location of "Grounding" Work is shown in the Contract Documents. This section includes grounding of electrical systems and equipment. Grounding requirements specified in this section may be supplemented by special requirements of systems described in other Sections.

1.03 GOVERNING CODES, STANDARDS AND REFERENCES

- A. ASTM B8 (American Society for Testing and Materials) - Standard Specification for Concentric-Lay-Stranded Copper conductors, Hard, Medium-Hard, or Soft.
- B. NFPA 70 (National Fire Protection Association) - National Electrical Code.
- C. ANSI/NFPA 780 (National Fire Protection Association) - Standard for the Installation of Lightning Protection Systems.
- D. ANSI/UL 96 (Underwriter's Laboratory) - Lightning Protection Components.
- E. ANSI/UL 467 (Underwriter's Laboratory) - Grounding and Bonding Equipment.

1.04 SUBMITTALS

- A. Submit materials data in accordance with of Section 01 33 00 - Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, calibration reports, and installation instructions for all products.
- B. Submittals shall include the following:
 - 1. Submit product data for the following:
 - a. Grounding conductors and cables.
 - b. Grounding connectors.
 - c. Grounding electrodes.
 - d. Ground bus.
 - e. Test wells.
 - f. Exothermic weld kit
 - 2. Grounding plans and calculations for Contractor's designed ground system.

3. Submittal log of locations where Contractor will bond grounding conductors to structural steel.
4. Field Test Reports: Submit written test reports to include the following:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
 - d. Soil types and conditions where ground tests were performed.
5. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - a. Test wells.
 - b. Ground rods.
 - c. Ground rings.
 - d. Grounding arrangements and connections for separately derived systems.

1.05 QUALITY ASSURANCE

- A. Listing and Labeling: Provide electrical components, devices, and accessories that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for specific types, sizes, and combinations of conductors and connected items.
- B. Comply with IEEE 837 and UL 467.
- C. Comply with IEEE Std. 142 (Green Book).
- D. Comply with NFPA 70.
- E. Comply with IEEE C2 for overhead-line construction and medium-voltage underground construction.
- F. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Grounding Conductor Fittings:
 - a. Erico Inc.
 - b. Chance/Hubbell.
 - c. Fushi Copperweld.
 - d. Erico Inc.; Electrical Products Group.
 - e. Framatome Connectors; Division of Bain Capital.
 - f. Burndy Electrical; Division of Hubbell.

- g. Ideal Industries, Inc.
 - h. ILSCO.
 - i. Kearney/Cooper Power Systems.
 - j. Lyncole XIT Grounding; Division of VFC.
 - k. O-Z/Gedney Co.
 - l. Raco, Inc.; Division of Hubbell.
 - m. Thomas & Betts, Electrical; Division of ABB.
 - n. Or Approved Equal.
2. Grounding Connectors and Rods:
- a. Harger
 - b. Galvan
 - c. Erico.
 - d. ILSCO.
 - e. Lyncole XIT Grounding; Division of VFC.
 - f. O-Z/Gedney.
 - g. Raco, Inc.; Division of Hubbell.
 - h. Thomas & Betts; Division of ABB.
 - i. Or Approved Equal.
3. Acceptable Manufacturers Ground Bars
- a. Harger GBI series
 - b. Erico EGBA series
 - c. Or Approved Equal.

2.02 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables
- B. Material: Stranded Copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation in sizes available.
- D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.
- E. Grounding Electrode Conductors: Stranded cable, size as shown in drawings.
- F. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.
- G. Bare Copper Conductors: Assembly of stranded conductors, ASTM B 8.
- H. Copper Bonding Conductors:
 - 1. Bonding Conductor: #4 or #6 AWG, stranded copper conductor, sized per drawings.

2. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.59 mm) thick.

- I. Bonding Straps: Soft copper.

2.03 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Pressure Connectors: High-conductivity-plated units.
- C. Bolted Connectors: Heavy-duty, copper, bolted-pressure type only.
- D. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.
- E. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.04 GROUNDING ELECTRODES

- A. Ground Rods: Solid copper clad steel, 3/4-inch diameter by 10-foot length.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.
- D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- E. Ground Rod Clamps at Manholes: Use bolted pressure clamps with at least two bolts.
- F. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 1. Use insulated spacer; space 1 inch (25.4 mm) from wall and support from wall 6 inches (152.4 mm) above finished floor, unless otherwise indicated.
 2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the specified height above the floor.
- G. Underground Grounding Conductors: Install bare stranded copper conductor, size as indicated on drawings.
 1. Copper conductor, #2/0 AWG minimum. Bury at least 24 inches (609.6 mm) below grade.
 2. Ductbank Ground Conductors: Install a #4/0 AWG bare copper conductor embedded in concrete of each medium voltage ductbank. Provide a ground conductor with each medium voltage feeder circuit sized per the NEC.

3.02 EQUIPMENT GROUNDING CONDUCTORS

- A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
- B. Install equipment grounding conductors in raceways with all feeders and branch circuits unless otherwise noted.
- C. Provide an exterior personal safety ground bus bar on the back side of all medium voltage switchgear.
- D. Busway Supply Circuits: Install insulated equipment grounding conductor from the grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- E. Circuits: Install insulated equipment grounding conductor in branch-circuit runs from power panels or power-distribution units.
- F. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal.
 - 1. Isolate grounding conductor from raceway and from panelboard grounding terminals.
 - 2. Terminate at equipment grounding conductor terminal of the applicable derived system or service.
- G. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

3.03 BUILDING PERIMETER GROUND

- A. Ground the steel framework of structures and enclosures with the ground electrode system.

3.04 INSTALLATION

- A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes and connect to the service grounding electrode conductor.
 - 1. Drive ground rods until tops are 2 inches (50.8 mm) below finished floor or final grade.
 - 2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except as otherwise indicated. Make connections without exposing steel or damaging copper coating.
- B. Grounding Conductors: Route along shortest and straightest paths possible. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment.
 - 1. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp.
 - 2. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts.
 - 3. Install straps only in locations accessible for maintenance.

- D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building.
 - 1. Connect grounding conductors to main metal water service pipes by grounding clamp connectors.
 - 2. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting.
 - 3. Bond metal grounding conductor conduit or sleeve to conductor at each end.
- E. Equipment Structures: Comply with the requirements of IEEE C2, current edition.
 - 1. Grounding conductor shall be bare copper not less than 8 AWG.
 - 2. Gates shall be bonded to grounding conductor with flexible bonding jumper.
 - 3. Barbed wire shall be bonded to the grounding conductor.

3.05 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations: For #8 AWG and larger, use pressure-type grounding lugs. #10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Non-contact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Provide flexible grounding strap mounted to raceway exterior where raceway crosses a seismic joint.
 - 1. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing.
 - 2. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted-and clamped-type connections between conductors and ground rods.

- F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values.
- G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the grounding conductor.
- H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.06 IDENTIFICATION

- A. Identify grounding system components as required by the Authority Having Jurisdiction and as specified in Section 26 05 53 - Electrical Identification.

3.07 FIELD QUALITY CONTROL

- A. All ground system test shall be performed in the presence of the Engineer.
- B. Testing: Perform the following field quality-control testing:
 - 1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Test by one of the following methods for resistance measurement, and correct any deficiencies detected during testing:
 - 1) Perform fall of potential test per IEEE Standard No. 81, Section 9.04 on the main grounding electrode or system for each substation and building.
 - 2) Perform the two-point method test per IEEE No.81 Section 9.03 to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral and/or derived neutral points.
 - 3) Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point. Conduct test by passing a minimum of ten amperes dc current between ground reference system and the ground point to be tested. Measure voltage drop and calculate resistance by voltage drop method.
 - c. Test Requirements:
 - 1) Equipment Rated 500 kVA and Less: 10 ohms.

- 2) Equipment Rated 500 to 1000 kVA: 5 ohms.
 - 3) Equipment Rated More Than 1000 kVA: 2 ohms.
 - 4) Power Distribution Units or Panelboards Serving Electronic Equipment: 2 ohms.
 - 5) Substations, substation manholes, and Pad-Mounted Switching Equipment: 1 ohms.
 - 6) Manhole Grounds: 10 ohms.
- d. Excessive Ground Resistance: If resistance to ground exceeds specified values at any single ground location and as a collective ground system, notify Engineer promptly and include recommendations to reduce ground resistance.
4. Record test results. Provide bi-weekly Ground Resistance Test Report results to Engineer.
- C. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes.
1. Identify each ground rod by letter in alphabetical order, and key to the record of tests and observations.
 2. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

- A. The extent and location of “Hangers and Supports for Electrical Systems” Work is shown in the Contract Documents. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Definitions
 - 1. EMT: Electrical metallic tubing.
 - 2. IMC: Intermediate metal conduit.
 - 3. RMC: Rigid metal conduit.

1.02 GOVERNING CODES, STANDARDS, AND REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
 - 1. ASTM (American Society for Testing and Materials)
 - a. ASTM A325 – Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - b. ASTM A36/A36M – Carbon Structural Steel
 - c. ASTM A780 – Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - d. ASTM A1011/A1011M – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - 2. AWS (American Welding Society)
 - a. AWS D1.1/D1.1M – Structural Welding Code – Steel
 - 3. MSS (Manufacturers Standardization Society of the Valve and Fittings Industry)
 - a. MSS SP-58 Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application and Installation
 - 4. MFMA (Metal Framing Manufacturers Association)
 - a. MFMA-4 Metal Framing Standards Publication
 - 5. NECA (National Electrical Contractors Association)
 - a. NECA 1 – Standard Practice of Good Workmanship in Electrical Construction
 - b. NECA 101 – Standard for Installing Steel Conduits (Rigid, IMC, EMT)
 - 6. NFPA (National Fire Protection Association)
 - a. NFPA 70 (National Fire Protection Association) – National Electrical Code
 - 7. OSHA (Occupational Safety & Health Administration)

- a. OSHA 29 CFR 1910.7 – Occupational Safety and Health Standards – Definition and requirements for a nationally recognized testing laboratory
- 8. SSPC (The Society for Protective Coatings)
 - a. SSPC-PA 1 – Shop, Field, and Maintenance Painting of Steel

1.03 SUBMITTALS

- A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturer’s technical literature, standard details, project specifications, and installation instructions for all products.
- B. Submittals shall include the following:
 - 1. Product Data: For the following:
 - a. Steel slotted support systems.
 - b. Nonmetallic slotted support systems.
 - 2. Shop Drawings: Signed and sealed by a qualified Professional Engineer registered in the State of Washington. Show fabrication and installation details and include calculations for the following:
 - a. Trapeze hangers. Include Product Data for components.
 - b. Galvanized Steel slotted channel systems. Include Product Data for components.
 - c. Stainless Steel slotted channel systems. Include Product Data for components.
 - d. Nonmetallic slotted channel systems. Include Product Data for components.
 - e. Equipment supports.
 - 3. Field quality-control reports.

1.04 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authority having jurisdiction.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Comply with NFPA 70.

1.05 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together in Division 3 Concrete.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.06 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

- C. Wind-Restraint Loading:
 - 1. Basic Wind Speed: 85mph.

PART 2 - PRODUCTS

2.01 SUPPORT ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. ERICO International Corporation.
 - 3. Thomas & Betts Corporation.
 - 4. Unistrut; Atkore International.
 - 5. G-Strut; Gregory Industries.
 - 6. Or Approved Equal.
- B. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. 1-5/8 inch (41 mm) x 1-5/8 inch (41 mm) cross section.
 - 2. Formed from 0.1046 inch (2.66 mm) thick steel.
 - 3. Slots at maximum of 2 inches (50.8 mm) on center in webs, and flange edges turned toward web.
 - 4. Materials: 316 Stainless Steel
 - 5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 6. Channel Dimensions: Selected for applicable load criteria.
- C. Raceway and Cable Supports: All raceway and cable supports for exterior applications shall be 316 stainless steel.
- D. Conduit Support Devices: 316 Stainless steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: 316 stainless steel plates, shapes, and bars.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type 316 stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 6) Or Approved Equal
2. Clip type conduit fasteners are NOT allowed. All fasteners and clamps for conduit raceway support shall use mechanical bolted type hardware.
3. Concrete Inserts: 316 Stainless Steel or malleable-iron, slotted support system units; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: 316 Stainless Steel
5. Through Bolts: 316 Stainless Steel, hex head, and high strength.
6. Toggle Bolts: All-stainless steel springhead type.
7. Hanger Rods: Threaded 316 Stainless Steel.

2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: All raceway, box and cable supports shall be 316 Stainless Steel.

PART 3 - EXECUTION

3.01 GENERAL

3.02 APPLICATION

- A. Locations:
 1. Indoors Locations: Galvanized Steel products.
 2. Outdoors and Damp Locations: 316 Stainless Steel products.
 3. Corrosive Locations: 316 Stainless Steel.
- B. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for RMC as required by NFPA 70. Minimum rod size shall be 3/8 inch (9.52 mm) in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with 3/8 inch (9.52 mm) rod minimum and 1-5/8 inch (41 mm) square preformed steel slotted channel support system, sized so conduit capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 1. Secure raceways and cables to these supports with two-bolt conduit clamps approved for application by an agency acceptable to the authority having jurisdiction.

- E. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future loads within specified loading limits.

3.03 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified by applicable Engineer of Record.
- C. Raceways shall not be supported from ducts, pipes or other systems foreign to the electrical installation. The entire electrical installation shall be kept independent from any other trade.
- D. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, as permitted in NFPA 70.
 - 1. Raceways shall be supported with heavy-duty on-hole pressed steel straps on interior surfaces.
 - 2. Support pendent mounted raceways on 3/8 inch (9.52 mm) rod with pear shaped hanger or trapeze type hanger with 3/8 inch rod minimum and 1-5/8 inch (41 mm) square pre-formed channel and pipe clamps.
 - 3. Parallel surface mounted raceways shall be supported from 1-5/8 inch (41 mm) pre-formed channel and pipe clamps.
 - 4. Multiple conduit runs shall be grouped and neatly racked on trapeze hangers with spare room for minimum (2) 3/4 inch future conduits.
- E. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Determination shall be weight of supported components plus 200 lb.
- F. Equipment and Hanger Restraints:
 - 1. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.18 mm).
- G. Install cables so they do not bend across edges of adjacent equipment or building structure.
- H. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment- mounting channels are attached to wall.
 - 2. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
 - 3. Attachment to New Concrete: Bolt to channel type concrete inserts or use expansion anchors.
 - 4. Attachments to Existing Concrete: Use expansion anchors.
 - 5. Holes for Expansion Anchors in Concrete: Drill at locations and to depths that avoid reinforcing bars.

6. To Metal Stud Structures: Fasten with sheet metal screw or bolted fasteners.
 7. To Structural Walls or Slabs: Fasten with steel expansion shells and bolts. Provide flush concrete insert for multiple raceway support system.
 8. Structural Steel: Bolt to heavy duty beam clamps on flanges of beams and columns, or on upper truss chords or bar joists.
 9. Architectural Walls or Masonry Walls: Fasten with toggle bolts or molly screws.
 10. Provide flush concrete insert for multiple raceway support system.
 11. Attachments to Wood Structural Members: Install bolts through members.
 12. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.
- I. Drilled-in Anchors:
1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the Structural Engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 5. Set anchors to manufacturer's recommended torque using a torque wrench.
 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.04 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.05 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated. Concrete bases must not be less than 4" larger in both directions than supported unit to ensure anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete.
- C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.06 ADJUSTING

- A. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.07 PAINTING

- A. Touchup: Clean field welds and abraded areas.
 1. Galvanized Steel: Apply cold galvanizing for exposed steel surfaces.
 2. 316 Stainless Steel Surfaces: Clean bolted connections, and abraded areas.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2025.
- B. ISO 9000 - ISO Standards Compendium: ISO 9000 - Quality management; 2015.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- F. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
- G. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. SCTE 77 - Specifications for Underground Enclosure Integrity; 2023.
- J. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- K. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.
- L. UL 2024 - Standard for Cable Routing Assemblies and Communications Raceways; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

- A. This section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following: Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, manholes, and underground utility construction.

1.04 DEFINITIONS

- A. LFMC: Liquidtight flexible metal conduit.
- B. RGSC: Rigid galvanized steel conduit.
- C. RNC: Rigid nonmetallic conduit.
- D. RSC: Rigid steel conduit.

1.05 SUBMITTALS

- A. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work. Custom enclosures and cabinets.
 - 1. For handholes and boxes for underground wiring, including the following:
 - a. Duct entry provisions, including locations and duct sizes.
 - b. Frame and cover design.

- c. Grounding details.
 - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
 - e. Joint details.
- B. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
- 1. Structural members in the paths of conduit groups with common supports.
- C. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26, Include the following:
- 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will retain its enclosure characteristics, including its interior accessibility, after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Qualification Data: For professional engineer and testing agency.
- E. Source quality-control test reports.

1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch (1.02 mm) minimum.
- C. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch (1.02 mm) with overlapping sleeves protecting threaded joints.

- D. Joint Compound for Rigid Steel Conduit: Listed for use in cable connector assemblies and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.02 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Arnco Corporation.
 - 2. CANTEX Inc.
 - 3. CertainTeed Corp.; Pipe & Plastics Group.
 - 4. Condux International, Inc.
 - 5. Electri-Flex Co.
 - 6. Lamson & Sessions; Carlon Electrical Products.
 - 7. Manhattan/CDT/Cole-Flex.
 - 8. RACO; a Hubbell Company.
 - 9. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Type EPC-80-PVC, unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.

2.03 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Arnco Corporation.
 - 2. Endot Industries Inc.
 - 3. IPEX Inc.
 - 4. Lamson & Sessions; Carlon Electrical Products.
- B. Description: Comply with UL 2024; flexible type, approved for general-use installation.

2.04 METAL WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements.
- C. Description: Stainless Steel Sheet metal sized and shaped as indicated, NEMA EN 10250, Type 4X unless otherwise indicated.
- D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

- E. Wireway Covers: painted steel indoors, 316 SS outdoors, Hinged type and flanged-and-gasketed type in wet areas.

2.05 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 - 6. O-Z/Gedney; a unit of General Signal.
 - 7. Robroy Industries, Inc.; Enclosure Division.
 - 8. Scott Fetzer Co.; Adalet Division..
- B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- C. Small Sheet Metal Pull and Junction Boxes: NEMA 12 indoors, NEMA 4X outdoors.
- D. Hinged-Cover Enclosures: NEMA EN 10250, Type 12 indoor type 4X outdoor, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: painted Steel indoors, 316 Stainless Steel outdoors.
 - 2. Nonmetallic Enclosures: FRP.
- E. Cabinets:
 - 1. NEMA EN 10250, Type 12 indoors, Type 4X, 316 Stainless Steel outdoors, box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Painted steel indoors, 316 SS outdoors, Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.

2.06 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Description: Comply with SCTE 77.
 - 1. Color of Frame and Cover: Gray, ANSI 61.
 - 2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
 - 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

5. Cover Legend: Molded lettering, as indicated for each service.
 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 7. Handholes 12 inches (304.8 mm) wide by 24 inches (609.6 mm) long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation.
 - d. NewBasis.
 - e. Old Castle
 - f. Quazite

2.07 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.08 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 1. Tests of materials shall be performed by an independent testing agency.
 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 1. Exposed Conduit: Rigid steel conduit.
 2. Concealed Conduit, Above ground: Rigid steel conduit.

3. Underground Conduit: RNC, Type EPC-80-PVC, direct buried, unless otherwise noted.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA EN 10250, Type 4X.
 6. Application of Handholes and Boxes for Underground Wiring:
 - a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Non-deliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
 - b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Non-deliberate Loading by Vehicles: Polymer-concrete units, SCTE 77, Tier 8 structural load rating.
 - c. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf
- B. Comply with the following indoor applications, unless otherwise indicated: vertical loading.
1. All above ground conduits shall be RGSC type.
 2. All underground factory elbows shall be PVC coated RGSC.
 3. All conduits making transition from underground to above ground shall be PVC coated RGSC.
 4. Boxes and Enclosures: NEMA EN 10250, Type 4X, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

3.02 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches (152.4 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated

- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Change from nonmetallic raceway to rigid steel conduit before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than # 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches (304.8 mm) of slack at each end of pull wire.
- L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where otherwise required by NFPA 70.

3.03 INSTALLATION OF MINOR UNDERGROUND CONDUIT

- A. For major underground conduit installation, greater than 50 feet (1524 cm), comply with Division 26 Section "Underground Ducts and Raceways for Electrical Systems."
 - 1. All buried conduit shall be 6" below bottom of slab (if applicable). No conduits shall be encased in floor slabs.
- B. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earthwork" for pipe less
 - a. than 6 inches (152.4 mm)
 - 2. Install backfill as specified in Division 31 Section "Earthwork." in nominal diameter.
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand-tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (304.8 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earthwork."
 - 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (76.2 mm) of concrete.

- b. All stub-ups shall have threaded coupling set flush with floor. Plus those that are not in use. Install insulated grounding bushings on terminations at equipment.
- 5. Warning Planks: Bury warning planks approximately 12 inches (304.8 mm) above direct buried conduits, placing them 24 inches (609.6 mm) o.c. Align planks along the width and along the centerline of conduit.

3.04 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25.4 mm) above finish grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.05 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to finishes recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touch up coating as recommended by manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. AASHTO HB - Standard Specifications for Highway Bridges; 2005, with Errata.
- B. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2025.
- C. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
- D. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. SCTE 77 - Specifications for Underground Enclosure Integrity; 2023.
- G. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- H. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

- A. This Section includes the following:
 - 1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks.
 - 2. Handholes and boxes.
 - 3. Manholes.
- B. This section applies to power and communications systems.

1.04 DEFINITION

- A. RNC: Rigid nonmetallic conduit.

1.05 SUBMITTALS

- A. Product Data: For the following:
 - 1. Duct-bank materials, including reinforcing materials, separators and miscellaneous components.
 - 2. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
 - 3. Accessories for manholes, handholes, pull boxes, and other utility structures.
 - 4. Warning tape.
- B. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:
 - 1. Duct entry provisions, including locations and duct sizes.

2. Reinforcement details.
 3. Frame and cover design and manhole frame support rings.
 4. Ladder.
 5. Grounding details.
 6. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
 7. Joint details.
- C. Shop Drawings for Factory-Fabricated Handholes and Boxes Other Than Precast Concrete: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:
1. Duct entry provisions, including locations and duct sizes.
 2. Cover design.
 3. Grounding details.
 4. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
 5. Ladder cover details.
- D. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
- E. Product Certificates: For concrete and steel used in precast concrete manholes, handholes, and pull boxes as required by ASTM C 858.
- F. Qualification Data: For professional engineer and testing agency.
- G. Source quality-control test reports.
- H. Field quality-control test reports.
- I. All covers shall be traffic rated for heavy trucks.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Comply with ANSI C2.
- C. Comply with NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.
- B. Store precast concrete and other factory-fabricated underground utility structures at project site as recommended by manufacturer to prevent physical damage. arrange so identification markings are visible.
- C. Lift and support precast concrete units only at designated lifting or supporting points.

1.08 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Engineer no fewer than five days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Engineer's written permission.

1.09 COORDINATION

- A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field.
- B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by the Engineer.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Furnish cable-support stanchions, arms, insulators and associated fasteners and accessories in quantities equal to 5 percent of quantity of each item installed.

PART 2 - PRODUCTS

2.01 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2 Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B, Unless otherwise noted.
- C. Liquid-tight flexible metallic conduit.

2.02 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or other equal manufacturers.
 - 1. Cantex, Inc.
 - 2. CertainTeed Corp.; Pipe & Plastics Group.
 - 3. Condux International, Inc.
 - 4. ElecSys, Inc.
 - 5. Electri-Flex Company.
 - 6. IPEX Inc.
 - 7. Lamson & Sessions; Carlon Electrical Products.
 - 8. Manhattan/CDT; a division of Cable Design Technologies.
 - 9. Spiraduct/AFC Cable Systems, Inc.

B. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacing indicated while supporting ducts during concreting or backfilling.
2. Warning Tape: Underground-line warning tape specified in Division 16 Section "Electrical Identification" for power and communications systems.

2.03 PRECAST CONCRETE HANDHOLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or other equal manufacturer.

1. Oldcastle Precast Group
2. Columbia Precast Products.
3. Riverton Concrete Products; a division of Cretex Companies, Inc.
4. Utility Concrete Products, LLC.

B. Comply with ASTM C 858 for design and manufacturing processes.

C. Ferrous metal hardware shall be stainless steel.

D. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.

1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
2. Entire assembly shall be aircraft rated.
3. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
4. Cover Legend: Molded lettering, "ELECTRICAL" or COMMUNICATIONS."
5. Configuration: Units shall be designed for flush burial and have closed bottom.
6. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - a. Type and size shall match fittings to duct or conduit to be terminated.
 - b. Fittings shall align with elevations of approaching ducts and be located near interior corners of handholes to facilitate racking of cable.
7. Handholes 12 inches (304.8 mm) wide by 24 inches (609.6 mm) long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.04 PRECAST MANHOLES

A. General Use Manholes

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or other equal manufacturer.
 - a. Oldcastle Precast Group
 - b. Columbia Precast Products.

- c. Riverton Concrete Products; a division of Cretex Companies, Inc.
 - d. Utility Concrete Products, LLC.
- B. Comply with ASTM C 858, with structural design loading as specified in Part 3 "Underground Enclosure Application" Article and with interlocking mating sections, complete with accessories, hardware, and features.
- 1. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches (304.8 mm) vertically and horizontally to accommodate alignment variations.
 - a. Windows shall be located no less than 6 inches (152.4 mm) from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
 - b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
 - c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
 - 2. Duct Entrances in Manhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - a. Type and size shall match fittings to duct or conduit to be terminated.
 - b. Fittings shall align with elevations of approaching ducts and be located near interior corners of manholes to facilitate racking of cable.
 - 3. Manhole Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and locking provisions, aircraft load rating.
 - 4. Cover Legend: Molded lettering, "ELECTRICAL" or "COMMUNICATIONS."
- C. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

2.05 PULL BOXES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- 1. Armorcast Products Company.
 - 2. Carson Industries LLC.
 - 3. CDR Systems Corporation.
 - 4. Hubbell Power Systems; Lenoir City Division.
 - 5. New Basis.
- B. Description: Comply with SCTE 77.
- 1. Color: Gray.
 - 2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.

3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 5. Cover Legend: Molded lettering, "ELECTRIC" or "COMMUNICATIONS."
 6. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.
- C. Polymer Concrete Handholes and Boxes with Polymer Concrete Cover: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.

2.06 UTILITY STRUCTURE ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Bilco Company
 2. Hubbell Power Systems.
 3. McKinley Iron Works, Inc.
 4. NewBasis.
 5. Oldcastle Precast Group.
 6. Riverton Concrete Products; a division of Cretex Companies, Inc.
 7. Strongwell Corporation; Lenoir City Division.
 8. Underground Devices, Inc.
 9. Utility Concrete Products, LLC.
 10. Utility Vault Co.
- B. Ferrous metal hardware, where indicated, shall be hot-dip galvanized complying with ASTM A 153 and ASTM A 123.
- C. Manhole Frames, Covers, and Chimney Components: Comply with structural design loading specified for manhole.
1. Frame and Cover: Weatherproof, gray cast iron complying with
 - a. ASTM A 48/A 48M, Class 30B with milled cover-to-frame bearing surfaces; diameter, 29 inches (736.6 mm)
 - b. Special Covers: Recess in face of cover designed to accept finish material in paved areas.
 2. Cover Legend: Cast in. Selected to suit system.
 - a. Legend: "ELECTRIC-LV" for duct systems with power wires and cables for systems operating at 600 V and less.
 - b. Legend: "ELECTRIC-HV" for duct systems with medium-voltage cables.
 - c. Legend: "COMMUNICATIONS" for communications, data, and telephone duct systems.

3. Manhole Chimney Components: Precast concrete rings with dimensions matched to those of roof opening.
 - a. Mortar for Chimney Ring and Frame and Cover Joints: Comply with ASTM C 270, Type M, except for quantities less than 2.0 cu. ft. where packaged mix complying with ASTM C 387, Type M, may be used.
 - D. Manhole Sump Frame and Grate: ASTM A 48/A 48M, Class 30B, gray cast iron.
 - E. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, 2-inch diameter eye, and 1-by-4-inch bolt.
 1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.
 - F. Pulling Eyes in Non-concrete Walls: Eyebolt with reinforced fastening, 1-1/4-inch diameter eye, rated 2500-lbf Minimum tension.
 - G. Pulling-In and Lifting Irons in Concrete Floors: 7/8-inch-diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
 1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.
 - H. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches (70 mm) deep, flared to 1-1/4 inches (32 mm) minimum at base.
 1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.
 - I. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel wedge type with stainless-steel expander clip with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.
 - J. Cable Rack Assembly: Stainless Steel, except insulators.
 1. Stanchions: T-section or channel; 2-1/4-inch nominal size; punched with 14 holes on 1-1/2-inch centers for cable-arm attachment.
 2. Arms: 1-1/2 inches (38 mm) wide, lengths ranging from 3 inches (76.2 mm) with 450-lb minimum capacity to 18 inches (457.2 mm) with 250-lb minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
 3. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.
 - K. Cable Rack Assembly: Nonmetallic. Components fabricated from nonconductive, fiberglass-reinforced polymer.
 1. Stanchions: Nominal 36 inches (914.4 mm) high by 4 inches (101.6 mm) wide, with minimum of 9 holes for arm attachment.
 2. Arms: Arranged for secure, drop-in attachment in horizontal position at any location on cable stanchions, and capable of being locked in position. Arms shall be available in lengths ranging from 3 inches (76.2 mm) with 450-lb minimum capacity to 20 inches (508 mm) with 250-lb minimum capacity. Top of arm shall be nominally 4 inches (101.6 mm) wide, and arm shall have slots along full length for cable ties.
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- L. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 degrees Fahrenheit (1.67 degrees Celsius). Capable of withstanding temperature of 300 degrees Fahrenheit (148.89 degrees Celsius) without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
- M. Portable Manhole Ladders: UL-listed, heavy-duty fiberglass specifically designed for portable use for access to electrical manholes. Minimum length equal to distance from deepest manhole floor to grade plus 36 inches (914.4 mm). Three required.
- N. Cover Hooks: Heavy duty, designed for lifts 60 lb and greater. Six required.

PART 3 - EXECUTION

3.01 UNDERGROUND DUCT APPLICATION

- A. Ducts for Electrical Cables over 600 V: RNC, NEMA Type EPC-80-PVC, in reinforced concrete-encased duct bank, unless otherwise indicated.
- B. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-80-PVC, in direct-buried duct bank, unless otherwise indicated.
- C. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-80-PVC, in direct-buried duct bank, unless otherwise indicated.
- D. Underground Ducts for Telephone, Communications, or Data Cables: RNC, NEMA Type EPC-80-PVC, in reinforced concrete-encased duct bank, unless otherwise indicated.

3.02 UNDERGROUND ENCLOSURE APPLICATION

- A. Handholes, Manholes and Pullboxes:
 - 1. Units in Roadways, parking lots and other Deliberate Traffic Paths: Precast concrete. Aircraft Rated.

3.03 EARTHWORK

- A. Excavation and Backfill: Comply with Division 31 Section "Earthworks."
- B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.
- D. Do not cut existing pavement in the path of underground ducts and utility structures. Jack and bore under existing roadways and driveways as indicated.

3.04 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 25 feet (762 cm) , both horizontally and vertically, at other locations, unless otherwise indicated.

- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- D. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use
 - 1. Begin change from regular spacing to end-bell spacing 10 feet (304.8 cm) from the end bell without reducing duct line slope and without forming a trap in the line.
 - 2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole.
 - 3. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet (304.8 cm) outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition.
- F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- G. Pulling Cord: Install 100-lbf- test nylon cord in ducts, including spares.
- H. Direct-Buried Duct Banks:
 - 1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
 - 2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet (609.6 cm) of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches (152.4 mm) between tiers.
 - 3. Excavate trench bottom to provide firm and uniform support for duct bank.
 - 4. Install backfill as specified in Division 31, "Earthmoving."
 - 5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches (101.6 mm) over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction.
 - 6. Install ducts with a minimum of 3 inches (76.2 mm) between ducts for like services and 6 inches (152.4 mm) between power and communications ducts.
 - 7. Depth: Install top of duct bank below finished grade, as scheduled herein, unless otherwise indicated.
 - a. Primary Feeder and Service Lateral Duct– 36"
 - b. 480/277V, 208/120V and Communications Duct – 24"

3.05 GROUNDING

- A. Ground underground ducts and utility structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.06 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
 - 2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
 - 3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 05 26 Section "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.
- C. Prepare test and inspection reports.

3.07 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.
- B. ASTM A603 - Standard Specification for Metallic-Coated Steel Structural Wire Rope; 2019.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other specification sections, apply to this Section.

SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Spring isolators.
 - 3. Restrained spring isolators.
 - 4. Channel support systems.
 - 5. Restraint cables.
 - 6. Hanger rod stiffeners.
 - 7. Anchorage bushings and washers.
- B. Related Sections include Division 26 05 29 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

DEFINITIONS

- A. The IBC: International Building Code, currently adopted Edition.

PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 - 1. Site Class as Defined in the IBC.
 - 2. Assigned Seismic Use Group or Building Category as Defined in the IBC.

SUBMITTALS

- A. Product Data: For the following:
 - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 - 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.

- b. Annotate to indicate application of each product submitted and compliance with requirements.
 3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.
- B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Division 26 Sections for equipment mounted outdoors.
 2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
 3. Field-fabricated supports
 4. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacing. Identify components, list their strengths and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
- C. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.
- D. Welding certificates
- E. Qualification Data: For professional engineer and testing agency
- F. Field quality-control test reports

QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel per AWS D1.1, "Structural Welding Code - Steel."

- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval by an agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- E. Comply with NFPA 70.

PART 2 PRODUCTS

7.01 VIBRATION ISOLATORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Cooper B-Line, Inc.
 - 2. Approved Alternative
- B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil- and water-resistant neoprene or rubber.
- C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - 1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447.38 kPa)
 - 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
 - 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - 2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 - 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

SEISMIC-RESTRAINT DEVICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.
 4. Hilti Inc.
 5. Mason Industries.
 6. TOLCO Incorporated; a brand of NIBCO INC.
 7. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- D. Restraint Cables: ASTM A603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- E. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod. Do not weld stiffeners to rods.
- F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
- G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
- H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested per ASTM E488. Minimum length of eight times diameter.

- J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested per ASTM E488.

FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory assembled and tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 EXECUTION

10.01 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
 - 1. Install restrained isolators on electrical equipment.
 - 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.18 mm).
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- D. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - 2. Schedule test with Owner's Representative, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days advance notice.
 - 3. Obtain Owner Representative's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - 4. Test at least four of each type and size of installed anchors and fasteners selected by owner.
 - 5. Test to 90 percent of rated proof load of device.
 - 6. Measure isolator restraint clearance.

7. Measure isolator deflection.
 8. Verify snubber minimum clearances.
 9. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
1. Prepare test and inspection reports.

ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.
- B. 29 CFR 1910.145 - Accident Prevention Signs and Tags; Current Edition.
- C. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- D. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.
- E. IEEE C2 - National Electrical Safety Code; 2012.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.02 SUMMARY OF WORK

- A. The extent and location of "Electrical Identification" Work is shown in the Contract Documents. This section includes identification of electrical materials, equipment, and installations.

1.03 GOVERNING CODES, STANDARDS AND REFERENCES

- A. ANSI/IEEE C2 - National Electrical Safety Code
- B. NFPA 70 (National Fire Protection Association) - National Electrical Code, References

1.04 SUBMITTALS

- A. Submit materials data in accordance with Section 01 33 00 - Submittal Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Submittals shall include the following:
 - 1. Product Data for each type of product specified.
 - 2. Schedule of identification nomenclature to be used for identification signs and labels.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.
- B. Comply with ANSI C2, ANSI A13.1., ANSI Z535.4, 29 CFR 1910.144 and 29 CFR 1910.145.
- C. Comply with Port of Tacoma standards for electrical equipment identification.
- D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.06 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 STANDARD PRODUCTS

- A. Manufacturer's standard products with colors prescribed by ANSI A13.1, NFPA 70, and these Specifications. Only temporary markings that are removable without damaging finish are permitted on equipment.
 - 1. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Install labels and nameplates parallel to equipment lines. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 2. Provide engraved laminated phenolic plastic or melamine label for equipment as noted below. Securely attach engraved labels with blunt end, self-tapping stainless steel screws with blunt ends. Sheet metal screws are not allowed. Provide white letters on black background for normal power, white letters on red background for emergency power.
 - a. Provide 5/8-inch minimum height letters on the following equipment:
 - 1) Panelboards, provide labels and warning signs. Secure nameplates to inside surface of door where panel is recessed in finished locations.
 - 2) Switchboards/distribution centers, motor control centers and power centers, padmounted transformers
 - 3) Secondary feeder breakers in distribution equipment
 - 4) Automatic and manual transfer switches. Labels shall include both normal and emergency source and load.
 - 5) Special equipment housed in cabinets, on outside door
 - 6) Terminal junction boxes and data gathering panels
 - 7) Cable trays
 - 8) UPS equipment
 - b. Provide 1/4-inch minimum height letters on the following equipment:
 - 1) Disconnects and starters for motors on fixed appliances and starters in MCCs
 - 2) Motor controllers and VFDs.
 - 3) Enclosed switches and circuit breakers
 - 4) Low voltage transformers
 - 5) Feeder circuit breakers in switchboards, switchgear, and distribution panelboards. Circuit breakers shall be labeled with destination panel name or load.

- 6) Duplex receptacles (self adhesive labels indicating panel and circuit number)
 - 7) Local control panels
 - 8) Raceways and junction boxes
 - 9) Instrumentation Labels
- c. Refer to table and descriptions in subparagraphs below for acceptable labeling procedure:

SECTION	TITLE	LABEL TYPES														
		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
26 05 26	Grounding			5/8		X										
26 05 33	Raceways and Boxes															X
26 05 43	Underground Ducts and Manholes						X		X	X	X	X				X
26 24 16	Panelboards			1/2												
26 27 16	Cabinets and Enclosures			3/8												
26 43 13	Transient Voltage Suppression			3/8												

- B. Heat-shrink preprinted tubes, flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 degree F. Comply with UL 224.
- C. Preprinted, flexible, self-adhesive vinyl label laminated with a clear weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- D. Engraved melamine plastic laminate flat stock, 1/16-inch minimum thickness for sizes up to 15 square inches. Use 1/8-inch minimum for sizes larger than 15 square inches. Black with white letters for normal power systems and red with white letters for emergency power systems, with height as shown in table above unless specified otherwise. UV-inhibited when used outdoors. Secure with stainless steel drive screws, stainless steel self-tapping screws or stainless steel oval-head 6-32 screws tapped into enclosure, or with stainless steel bolts with elastic stopnut.
- E. Adhesive-backed plastic machine-printed labels, white with black letters. Indicate panel name and circuit number(s).
 - 1. For Raceway at more than 600V, provide black letters on an orange field label with the legend, "HIGH VOLTAGE". Indicate feeder number.
- F. Plain-colored vinyl adhesive tape, 3-mil minimum by 1-inch wide minimum. Apply 1/2-inch minimum over-wrap through 2-inch minimum length.

- G. Engraved plastic melamine laminate flat stock. 1/16 inch (1.59 mm) minimum thickness for sizes up to and including 15 square inches, 1/8" thick for larger than 15 square inches. White background with black letters for normal power, red background with white letters for emergency power. Holes at each end for attachment with nylon ty-wraps.
- H. Not used
- I. Underground line warning tape with pre-printed warning message identifying type of system. Material shall be pigmented polyolefin, continuous-printed on one side, and compounded for unlimited life when direct buried. 6-inch minimum width by 4- mils thick. Tensile strength of 1750 psi (12065.83 kPa).
 - 1. Inscriptions for Red-Colored Tapes: ELECTRICAL LINE, HIGH VOLTAGE.
- J. Underground metallic line-warning tape with pre-printed warning message identifying type of system. Material shall be detectable three-layer laminate consisting of printed pigmented polyolefin, a solid aluminum-foil core with a clear protective film that allows inspection of the continuity of the conductive core, and compounded for unlimited life when direct buried. Use when metal-detection of line is required on Medium Voltage Systems. 6-inch minimum width by 4-mils thick.
 - 1. Inscriptions for Red-Colored Tapes: "CAUTION: MEDIUM VOLTAGE ELECTRICAL LINE BELOW"
- K. Warning signs: Baked Enamel on aluminum plate, punched or drilled for fasteners, with colors, legend, and size required for applications. ¼-inch grommets in corners for mounting. Minimum nominal size of 7 by 10 inches (254 mm) with 0.040-inch minimum thickness. OSHA standard wording where approved. Custom wording if required. Secure with non-corrosive fasteners.
 - 1. Where applicable, provide labels for multiple power source warning: "DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES"
- L. Warning labels: Self-adhesive, multicolor, flexible pressure-sensitive vinyl conforming to OSHA "Danger" and "Caution" standards. 2½ x1¾" minimum with black letters on yellow background. Label shall read: "WARNING! DO NOT USE AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL - CABLES ADDED AFTER INITIAL INSTALLATION REQUIRE POS/F & I APPROVAL."
 - 1. Where applicable, provide labels for multiple power source warning: "DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES"
- M. Stencils: Machine-punched patterns, nonfading waterproof paint with color and formulation appropriate for material and location. Minimum letter height shall be 1 inch (25.4 mm).
- N. Adhesive-backed metal labels manufactured with testing agency logo. Punched or engraved with actual settings and date. Label shall be 1/16-inch minimum thickness for sizes up to 15 square inches. Use 1/8-inch minimum for sizes larger than 20 square inches. Black with white letters for normal power systems and red with white letters for emergency power systems, with height as shown in table above unless specified otherwise.
- O. Stainless-steel machine or hand-stamped wire marker plates with one hole at each end for attachment with non-corrosive fasteners that do 0.010-inch minimum thickness (for outdoor application).
- P. Adhesive machine-printed plastic tape, cut to length, black with white letters unless specified otherwise. 3/8-inch minimum width of tape in unfinished areas only. Provide white lettering on red background when served by an emergency source.

2.02 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Floor Marking: Coordinate with the Port Electric Shop for painting working clearances on the floor in front of the equipment.
- B. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior and interior).

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fasteners for labels and signs: Self tapping, blunt-ended stainless-steel screws, or stainless-steel machine screws with nuts and flat and lock washers. Sheet metal screws are not acceptable. Self-drilling screws are not allowed.
- B. Install identification labels according to manufacturer's written instructions.
- C. Install labels where indicated and as required by the Authority Having Jurisdiction and the Department of Labor and Industries. Locate for optimum viewing and without interference with the operation and maintenance of equipment.
- D. Verify identity of each item before installing identification products.
- E. Labeling abbreviations not permitted without F&I approval.
- F. Temporary markings allowed only if removable without damage to equipment or enclosure finish.
- G. System Identification Color-Coding Bands for Raceways: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
 - 1. Blue
 - 2. Yellow
 - 3. Black
- H. Cable Ties: For attaching tags. Use general-purpose type, fungus inert, self-extinguishing, one piece, self-locking Type 6/6 nylon, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In spaces handling environmental air: Plenum rated.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (203.2 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (406.4 mm) overall.
- J. Coordinate names, abbreviations, colors, graphics and other designations used for electrical identification with corresponding designations used in the Contract
 - 1. Documents or as required by codes and standards. Use consistent designations throughout the Project. Labeling abbreviations are not allowed.

- K. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish Work.
 - 1. Coordinate installing electrical identifying labels prior to installing acoustical ceilings and similar finishes that conceal such items.
- L. Clean surfaces of dust, loose material, and oily films before applying painted or self-adhesive identification products.
- M. Painted Identification Products:
 - 1. Prime surfaces according to manufacturer's instructions prior to applying painted labels:
 - a. For galvanized metal, use single-component, acrylic vehicle coating formulated for galvanized surfaces.
 - b. For concrete masonry units, use heavy-duty, acrylic-resin block filler.
 - c. For concrete surfaces, use clear, alkali-resistant, alkyd binder-type sealer.
 - 2. Apply one intermediate and one finish coat of paint.

3.02 IDENTIFICATION SCHEDULE

- A. Panelboard Schedules:
 - 1. Panelboard schedules shall utilize the Port of Tacoma standard panel schedule in Microsoft Excel format which has provision for totaling all loads and performing demand calculations by load category.
- B. Medium Voltage Raceways: Provide 5/8 inch (15.88 mm) high stenciled or manufactured letters noting "HIGH VOLTAGE", black letters on yellow background on all exposed feeder conduits where entering or leaving switchboards and along conduit runs at 25 feet (762 cm) on center.
- C. Accessible Raceways, More Than 600 V: Self-adhesive vinyl labels. Install labels at all conduit penetrations and along length of exposed conduit run at 25 foot (762 cm) maximum intervals.
- D. Accessible Raceways within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage.
 - 1. Provide labels on all raceways, junction and pull boxes indicating panel designation and circuit number for all circuits in raceway or box, and conduit destination.
 - a. Conduit Label Example: B2-P4-23G-1/1,3,5, B-2601-9.
 - b. Provide labels at all locations where conduit penetrates walls, floors and ceilings, on both sides of penetration.
 - c. Provide labels at all ends or breaks in conduit runs such as electrical rooms, junction boxes, pull boxes, cabinets, maintenance holes, fire penetrations, etc.
 - d. Provide labels on each conduit entering junction or pull box within 12" of junction or pull box.
 - e. Provide labels at 25 foot (762 cm) maximum intervals along conduit runs.
 - f. Provide labels on all junction and pullboxes, including in accessible ceiling spaces and exposed in unfinished areas. Refer to specification sections for identification requirements for systems contained within.

- g. Install labels parallel to equipment lines.
 - h. Labels in unfinished locations, including in accessible ceiling spaces and exposed unfinished areas shall be machine printed vinyl labels minimum ½ inch high, white with black letters. Labels in finished locations shall be adhesive-backed plastic machine printed labels, minimum 3/8 inch (9.52 mm) high, white with black letters.
 - i. Lettering shall be a minimum of ¼" high.
 - j. In finished locations, provide labels on inside of junction or pull box cover.
 - k. Provide red lettering when served by an emergency source.
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
- 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for feeder and branch-circuit conductors.
 - a. Provide colored insulation when available, typically for wire sized #8 AWG and smaller.
 - b. Provide minimum 2 inch (50.8 mm) wide band of colored plastic tape at all terminations and splices (where allowed). 3M Scotch No. 35, Or Approved Equal Electrical Color Coding Tape.
 - c. Colors for 480/277V 3Ø, 4-wire systems:
 - 1) Brown.
 - 2) Orange
 - 3) Yellow
 - 4) Gray
 - 5) Green
 - d. Colors for 208/120V, 3Ø, 4-wire systems:
 - 1) Black
 - 2) Red
 - 3) Blue
 - 4) White
 - 5) Green
 - 6) Green with yellow or orange stripe
 - e. Colors for 120/240V, 1Ø, 3-wire systems: (non-standard)
 - 1) Black
 - 2) Red
 - 3) White
 - 4) Green

- f. For 240-delta systems (obsolete) the color of the high leg (approximately 200 volts to ground) shall be red. Label interior of all equipment "CAUTION: HIGH LEG IS OVER 120V TO GROUND. DO NOT USE FOR 120V CIRCUITS".
 - g. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (152.4 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
2. Provide wire markers on each conductor in panelboards, gutters, pull boxes, outlet and junction boxes and at the load connection. Identify with branch circuit or feeder number for power and lighting circuits.
 - a. Install conductor labeling in panelboards and enclosures to ensure labels are visible.
- F. Power-Circuit Conductor Identification, Medium Voltage: Provide labeling at all accessible locations including each termination or interconnection of wiring, and in vaults, pull and junction boxes, manholes, and handholes. Identify conductors with cloth type, split sleeve or tubing type wire and cable markers.
1. Label each cable with phase designation, operating voltage and circuit number.
 2. Color Coding for Phase:
 - a. 4160Y/2400V AC 3Ø, 4-wire:
 - 1) Black/Pink
 - 2) Red/Pink
 - 3) Blue/Pink
 - 4) White/Pink
 - b. 4160V Delta AC, 3Ø, 4-wire
 - 1) Black/Brown
 - 2) Red/Brown
 - 3) Blue/Brown
 - c. 12,470V Delta AC, 3Ø, 4-wire
 - 1) Black/Orange
 - 2) Red/Orange
 - 3) Blue/Orange
 3. Provide write-on tags or nonmetallic plastic tag holder with adhesive- backed phase tags, and a separate tag with the circuit designation.
- G. Install instructional sign including the color code for grounded and ungrounded conductors using adhesive-film-type labels.
- H. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.

1. Provide wire markers on each conductor in wire gutters, pull boxes, outlet and junction boxes and at the equipment connection. Identify with control wire number as indicated on schematics and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.
- I. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation
- J. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- K. Conductor Identification:
 1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
 2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color coding for voltage and phase indication of secondary circuit.
 3. Multiple Control and Communications Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color coding, or cable marking tape.
- L. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- M. Workspace Indication: Install floor marking tape or paint to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- N. Warning, Caution, and Instruction Signs:
 1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Provide OSHA standard text where approved. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location. Mount permanently in an appropriate location. Comply with ANSI A13.1 standard color and design.
 2. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
 3. Emergency-Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

- O. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Except as otherwise indicated, provide a single line of text with 1/4-inch high lettering on 1-inch high label. Use white lettering on black field. Apply labels parallel to equipment lines.
- P. Outdoor Equipment: Engraved, laminated acrylic or melamine label, to comply with requirements listed above. Provide panel schedule printed on 8.5x11 paper in Port standard format in each panelboard. Insert folded schedule in schedule holder on inside of panel door. Posted panel schedule shall be updated to reflect all new work in panel. Include project completion date on schedule.
- Q. Provide self-adhesive tape labels on all receptacle cover plates. Labels shall be machine printed with black lettering on white or clear background.
 - 1. Indicate source panel name and circuit number.
 - 2. Provide red lettering on white or clear background for devices on emergency circuits.
 - 3. Where receptacle faceplate is dark color, provide white letters on clear background.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. The intent of Commissioning is to verify systems and equipment are being delivered to the Port of Tacoma fully functioning in accordance with project documents and for which the Port's personnel are fully trained and equipped to operate, maintain and troubleshoot. Additionally, the Port shall have supporting documentation to enable Port staff to maintain systems and equipment in accordance with manufacturer's recommendations and the Port's intent to sustain operations over the life of the system or equipment.
- B. Commissioning services shall be provided by the contractor hired commissioning agent. Contractor shall perform related work as specified to assist Owner's personnel in the commissioning process.
- C. Commissioning services for specialty equipment shall be provided by the manufacturer's factory authorized representative and shall coordinate with the contractor's hired commissioning agent. Contractor shall perform related work as specified to assist Owner's personnel in the commissioning process.

1.02 TERMS AND DEFINITIONS

- A. Commissioning: The process certifying that mechanical, electrical, communications, control, and life safety systems equipment, subsystems or systems, function together properly to meet performance requirements and design intent as shown in a composite manner in the Contract Documents.
- B. Commissioning Authority: The person or persons contracted by the Contractor to direct the commissioning process through appropriate contract channels and recommend project completion from the commissioning perspective.
- C. Systems: Group of components and equipment functioning as a unit or performing a common function. (IE: Chilled Water System: consisting of piping, valves, fittings, controls, chillers, expansion tanks, air relief, chemical treatment, pumps, etc.)
- D. Functional Testing: That full range of checks and tests carried out to determine if all components, sub-systems, systems, and interfaces between systems function in accordance with the contract documents. In this context, "function" includes all modes and sequences of control operation, all interlocks and conditional control responses, and all specified responses to abnormal emergency conditions.
- E. Acceptable Performance: A component or system shall meet specified design parameters and criteria under actual load conditions for duration of time as indicated within the functional test criteria as determined by technical specifications and manufacturer's literature.
- F. Areas of Conflict: Where 26 08 00 - Commissioning specifications or requirements conflict with Technical Specifications or other requirements, the Technical Specification requirements shall take precedence.

1.03 COMMISSIONING TEAM

- A. The commissioning team shall consist of the Port's representatives, Contractor's Commissioning Agent, Contractor, and other Subcontractors, Manufacturers, and the Project Engineers in accordance with their contractual arrangements with the Port. The Port's operating staff will be included during specific elements of the commissioning process. It is the intent that all members work together as a team to fulfill their contractual responsibilities and meet the objectives of the Contract Documents and make the project turnover and commissioning process seamless.

1.04 CONTRACTOR

- A. The Contractor shall execute the testing procedures in accordance with the commissioning plan.
- B. A Contractor's representative shall be present during all commissioning activities performed by itself or one of its Subcontractors.
- C. The Contractor will schedule and execute the commissioning plan to the satisfaction of the engineer.

1.05 DUTIES OF THE CONTRACTOR

- A. Execute the commissioning plan through the operation of equipment and systems by their subcontractors.
- B. Shall be solely responsible for the operations, testing, and results during the commissioning process for systems and equipment to perform in accordance with the contract documents.
- C. Notify the Engineer in writing that equipment and systems are ready for commissioning.
- D. Include within the master schedule, commissioning activities and durations.
- E. Professionally maintain shop drawings, as-built drawings and system single-line schematics and diagrams for all systems that are installed and are to be included in the O&M manuals and used during the commissioning process and training per Section 01 70 00.

1.06 COMMISSIONING PHASING AND SEQUENCING

- A. The Contractor shall coordinate all phasing and/or sequencing requirements to integrate the commissioning plan activities and durations within the master schedule.

1.07 ACCEPTANCE PROCEDURES

- A. The Contractor shall execute the commissioning plan and verify that all commissioning activities have been completed and all activities have successfully met or exceeded the established acceptance criteria.
- B. The Contractor shall provide all acceptance test results and documentation to the Engineer for review and acceptance.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 GENERAL

- A. Contractor shall operate equipment and systems and conduct all tests in presence of the Engineer and/or a designated Port Representative(s) to demonstrate compliance with technical specifications.

1. Testing shall be conducted under design operating conditions as defined within the specifications and in the commissioning plan and approved by the Engineer.
- B. All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of the technical specifications. Testing shall be accomplished on hierarchical basis. Each piece of equipment will be tested for proper operation, followed by each subsystem, followed by entire system, followed by interfaces to other major systems.
- C. Contractor or their subcontractor shall provide all special testing materials and test equipment.

3.02 PRE-COMMISSIONING WORK

- A. Attend a commissioning scoping meeting and other meetings necessary to facilitate the commissioning process. One representative of the Contractor cognizant of respective aspects of their work shall attend commissioning meetings. Other trades shall attend the commissioning meetings when their portions of the work are being tested. The Owner's personnel will administer the meetings. Meeting location will be determined.
- B. Normal start-up services required to bring system into a fully operational state. This includes cleaning, filling, purging, leak testing, motor rotation check, control sequences of operation, full and part load performance, and similar conditions.
- C. Completion of controls installation, calibration, programming, and testing is critical for efficient and successful commissioning process.

3.03 PARTICIPATION IN COMMISSIONING

A. DESCRIPTION

1. Start up and test of systems shall be by skilled technicians. Make these same technicians available to assist the Owner's personnel in completing the commissioning process as it relates to each system and their technical specialty.
 2. Coordinate work schedules, time required for commissioning, and similar conditions with the Owner's personnel. Ensure that qualified technicians are available and present during agreed upon schedules and for sufficient duration to complete necessary tests, adjustments, and problem resolutions.
- B. System Issues and Discrepancies: Additional technician time and Owner's personnel time may be required to resolve issues and discrepancies. Make additional technician time available for subsequent commissioning periods until required system performance is obtained.
1. Complete corrective work to permit completion of commissioning process.
 2. If deadlines pass without resolution of the problems, the Owner reserves right to obtain supplementary services and equipment to resolve problems. Costs incurred to solve problems in an expeditious manner will be the Contractor's responsibility.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 70B - Recommended Practice for Electrical Equipment Maintenance; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.
- D. NFPA 101 - Life Safety Code; 2015.

1.02 SECTION INCLUDES

- A. Electrical acceptance testing

1.03 RELATED SPECIFICATIONS

- A. 26 05 19 Low Voltage Electrical Power Conductors and Cables
- B. 26 05 26 Grounding & Bonding for Electrical Systems
- C. 26 08 00 Commissioning of Electrical Systems

1.04 CONTRACTOR INSPECTION AND TESTING

- A. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Low Voltage Power Cables upon completion of installation.
- B. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of the Electrical Ground Systems upon completion of installation.
- C. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Switchboards upon completion of installation.
- D. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Engine Generators upon completion of installation.
- E. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Transfer Switches upon completion of installation.
- F. Tests are to ensure that electrical equipment is operational and within industry and manufacturer's tolerances, is installed in accordance with specifications, and to determine suitability for energization.

1.05 REFERENCED STANDARDS

- A. American National Standards Institute (ANSI)
 - 1. ANSI C2 National Electrical Safety Code
 - 2. ANSI Z244-1 American National Standard for Personnel Protection

- B. National Fire Protection Association (NFPA)
 - 1. NFPA 70 National Electrical Code
 - 2. NFPA 70B electrical Equipment Maintenance
 - 3. NFPA 70E Electrical Safety Requirements for Employee Workplaces
 - 4. NFPA 78 Lightning Protection Code
 - 5. NFPA 101 Life Safety Code
- C. Occupational Safety and Health Administration: OSHA -
 - 1. OSHA Part 1910 Subpart S, 1910.308
 - 2. OSHA Part 1926 Subpart V, 1926.950 through 1926.960
- D. State and local codes and ordinances

1.06 SUBMITTALS

- A. Test reports:
 - 1. Summary of Project, description of equipment tested, description of test, test results, conclusions and recommendations, appendix, including appropriate test forms, identification of test equipment used, and signature of responsible test organization authority. The Contractor shall submit five (5) copies of the complete report to the Owner/Engineer no later than 30 days after completion of project, unless directed otherwise.
- B. Certification of testing firm qualifications.
- C. Calibration program for test instrumentation indicating maintenance of rated accuracy.
- D. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted, and tested in accordance with the manufacturer's recommendations.
- E. The Contractor shall provide three (3) copies of the manufacturer's representative's certification before final payment is made.

1.07 1.06 QUALITY ASSURANCE

- A. The chosen testing agency shall exhibit and/or provide documentation for the following qualifications:
 - 1. A field service organization which can function as an unbiased testing authority professionally independent of the manufacturers, suppliers and installers of equipment or systems evaluated by the testing firm.
 - 2. Regularly engaged in the testing of electrical equipment devices, installations and systems for a minimum of 5 years.
 - 3. Meet Federal OSHA criteria for accreditation of testing laboratories, Title 29, Parts 1907, 1910 and 1936.
 - 4. Provide lead test engineer on site currently certified by the international Electrical Testing Association (NETA) or have at least 5 years experience in electrical power distribution system testing.

5. The firm shall utilize only full-time technicians who are regularly employed by the firm for testing services. Electrically unskilled employees shall not be permitted to perform testing or assistance. Electricians and linemen may assist, but may not perform testing and inspection services.
6. The Contractor shall submit proof of the above qualifications with bid documents when requested.

1.08 CONTRACTOR RESPONSIBILITY

- A. Perform conductor insulation resistance, and continuity tests for distribution and utilization equipment before, and in addition to, tests performed by the testing firm.
- B. Supply source of electrical power to each test site as specified by testing firm.
- C. Notify the testing firm when equipment becomes available for acceptance tests. Coordinate to expedite project scheduling.
- D. Correct any and all defects identified by the testing firm.

1.09 TESTING FIRM RESPONSIBILITY

- A. Notify the engineer before commencement of testing.
- B. Report systems, materials or workmanship that is found defective on the basis of acceptance tests.
- C. Maintain written record of tests and upon completion of project, assemble and certify a final test report.

1.10 LIMITATION OF AUTHORITY OF TESTING FIRM

- A. Testing firm is not authorized to:
 1. Release, revoke, alter, or enlarge on requirements of contract documents.
 2. Approve or accept any portion of the work.
 3. Perform duties of contractor.
 4. Stop the work.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. Calibration
 1. Testing firm to have a calibration program that ensures that applicable test instrumentation are maintained within rated accuracy.
 2. Accuracy to be directly traceable to the National Institute of Standards and Technology (NIST).
 3. Calibrate instruments in accordance with the following frequency schedule:
 - a. Field instruments: Analog - 6 months maximum
Digital - 12 mos. maximum
 - b. Laboratory instruments: 12 months
 - c. Leased specialty equipment: 12 months, (where accuracy is guaranteed by lessor)

4. Provide visible, dated calibration labels on test equipment.
5. Keep records up-to-date showing date and results of instruments calibrated or tested.
6. Maintain up-to-date instrument calibration instruction and procedure for each test instrument.
7. Calibrate using standard of higher accuracy than that of the instrument tested.

B. Tests

1. In addition to standard NETA testing, provide as a minimum, the following tests for each system component as applicable. Document test results and submit for final acceptance.
 - a. Operational test of each Panelboards, EVSEs, ground system and low voltage cables
 - b. Cable Insulation test
 - c. Bus insulation resistance test phase-to-phase and phase-to-ground.
 - d. Bolt torques for bus connections.
 - e. Inspect for damage and code violations.
 - f. Inspect and measure resistance of ground connections.
 - g. Verify correct sizing of all equipment

PART 3 - EXECUTION

3.01 SAFETY AND PRECAUTIONS

- A. Use safety practices conforming to the following requirements:
 1. Occupational Safety and Health Act of 1970 - OSHA
 2. Accident Prevention Manual for Industrial Operations, National Safety Council, Chapter 4.
 3. Applicable state and local safety operating procedures.
 4. Owner's safety practices.
 5. National Fire Protection Association - NFPA 70E.
 6. ANSI Z244.1, American National Standards for Personnel Protection
- B. Perform tests with apparatus de-energized except where otherwise specifically required and stated in equipment sections.
- C. The testing firm will provide designated safety representative on the project or supervise operations with respect to safety.
- D. Utilize the following references for inspections and tests:
 1. Project design specifications
 2. Project design drawings
 3. Manufacturer's instruction manuals applicable to each particular apparatus.

3.02 2 FIELD QUALITY CONTROL

- A. Max. Voltage Rating of Equipment (Volts DC): 600
 1. Minimum Test Voltage (Volts DC): 1000

2. Recommended Minimum Insulation Resistance (Meg-ohms): 100

B. Insulation resistance correction factors for conversion of test temperature to 20°C:

Temperature		Multiplier
°C	°F	
0	32	.40
5	41	.45
10	50	.50
15	59	.75
20	68	1.00
25	77	1.30
30	86	1.60
35	95	2.05
40	104	2.50
45	113	3.25
50	122	4.00
55	131	5.20
60	140	6.40
65	149	8.70
70	158	10.00
75	167	13.00
80	176	16.00

C. Bolt torques for bus connections:

1. Heat treated steel - Cadmium or zinc plated

Grade	SAE 1&2	SAE 5	SAE 6	SAE 8
Minimum Tensile (psi)	64k	105k	133k	150k
Bolt Diameter	Torque (Foot Pounds)			
1/4	4.0	5.6	8.0	8.4
5/16	7.2	11.2	15.2	17.6
3/8	12.0	20.0	27.2	29.6
7/16	19.2	32.0	44.0	48.0
1/2	29.6	48.0	68.0	73.6
9/16	42.4	70.4	96.0	105.6
5/8	59.2	96.0	133.6	144.0
3/4	96.0	160.0	224.0	236.8
7/8	152.0	241.6	352.0	378.4
1	225.6	372.8	528.0	571.2

2. Silicon bronze fasteners*:

Torque (Foot Pounds)		
Diameter	Non Lubricated	Lubricated
5/16	15	10
3/8	20	14

1/2	40	25
5/8	55	40
3/4	70	60

* Bronze alloy bolts to have a minimum tensile strength of 70,000 pounds per square inch.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- B. NEMA ST 20 - Dry Type Transformers for General Applications; 2021.
- C. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.02 SUMMARY OF WORK

- A. The extent and location of "Dry-Type Transformers" Work is shown in the Contract Documents. This section includes Dry-Type Transformers, under 600-Volt Class, of the following types:
 - 1. Single-Phase, 3-167 kVA
 - 2. Three-Phase, 3-1000 kVA
 - 3. Three-Phase, K-Factor, 15-500 kVA
 - 4. Buck-Boost, 0.25-5 kVA

1.03 GOVERNING CODES, STANDARDS AND REFERENCES

- A. NEMA EN 10250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum),
- B. NEMA ST 20 (National Electrical Manufacturers Association) - Dry-Type Transformers for General Applications,
- C. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems,
- D. NFPA 70 (National Fire Protection Association) - National Electrical Code,
- E. UL 1561 - (Underwriters Laboratory) - Dry Type General Purpose and Power Transformers,

1.04 SUBMITTALS

- A. Submit materials data in accordance with Section 01 33 00 - Submittals. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.
- B. Submittals shall include the following:
 - 1. Product Data: Submit outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, rated temperature rise, compliance with seismic rating and labeling requirements.
 - 2. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.

3. Manufacturer Seismic Qualification Certification: Submit certification that transformers will withstand seismic forces defined in Section 26 05 48 - Seismic Controls for Electrical and Communication Work. Include the following:
 - a. Basis of Certification: Verify whether withstand certification is based on actual test of assembled components.
 - 1) The term "withstand" means the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event.
4. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
5. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years successful in-service performance.
- B. Listing and Labeling: Provide components, devices, and accessories that are Listed and Labeled as defined in NFPA 70, Article 100 and marked for intended use for the location and environment in which they are installed.
- C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

1.06 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 in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.07 COORDINATION

- A. Coordinate layout and installation of transformers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access and ventilation.
- B. Coordinate size and location of concrete bases with actual equipment supplied. Cast anchor-bolt inserts into bases, in accordance with drawings and Section 26 05 48 - Seismic Controls for Electrical and Communication Work. Refer to Division 3 Concrete for concrete, reinforcement, and formwork requirements.
- C. Coordinate equipment supports, roof penetrations, and installation of roof curbs. Refer to Division 7 Thermal and Moisture Protection for roof accessory requirements.

PART 2 - PRODUCTS

2.01 GENERAL PURPOSE TWO-WINDING TRANSFORMERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.

2. ABB
 3. Siemens.
 4. Square D Co.; Division of Schneider Electric.
 5. Or Approved Equal.
- B. Label: UL label required (except 1000 kVA 3-phase).
- C. Construction:
1. Description: Copper, two-winding, dry-type, 3-phase units using 1 coil per phase in primary and secondary, size as indicated.
 2. Compliance: Comply with NEMA ST 20 and UL 1561.
 3. Insulation Class:
 - a. 15 kVA and smaller - 185°C class.
 - b. Larger than 15 kVA - 220°C class.
 4. Insulation Temperature Rise:
 - a. 1-phase - 115°C rise above 40°C ambient.
 - b. 3-phase - 115°C rise above 40°C ambient.
 5. Basic Impulse Level:
 - a. 3-300 kVA - 10kV
 - b. Over 300 kVA - 30kV
 6. Impedance (%Z): Between 3% and 5% unless otherwise approved by F&I, including K-rated transformers.
 7. Taps: 2-2 1/2% FCAN, 2-2 1/2% FCBN
 8. Enclosure:
 - a. Indoor, ventilated: NEMA 3R
 - b. Outdoor, ventilated, raintight, NEMA 3R
 - c. Outdoor areas, Ramp and Airfield: NEMA 3R Vacuum Pressure Insulated (VPI) with openings facing toward building.
 - d. Outdoor, other locations: Totally enclosed, non-ventilated, raintight NEMA 3R.
 - e. Finish: ANSI 61 gray.
 9. Case temperature: 35°C rise above ambient at warmest point at full load.
 10. Sound Level Standards: Sound level standards as defined in NEMA and ANSI.
 11. K-Factor transformers: Purpose-designed for high harmonic loads, 200% neutral, electrostatic shield.
 12. Nameplate: Include transformer rating, transformer connection data and K-Factor (where applicable).
 13. Seismic Rating: Refer to Section 26 05 48 - Seismic Controls for Electrical and Communication Work.
-

D. Ratings:

1. Single-Phase Transformers (3-167kVA)
 - a. Primary Winding: 240/480 Volts.
 - b. Secondary Winding: 120/240 Volts.
 - c. Taps: 2-2 1/2% FCAN, 2-2 1/2% FCBN
2. Three-Phase Transformers (3-1000kVA).
 - a. Primary Winding: 480 Volts.
 - b. Secondary Winding: 208Y/120 Volts.

2.02 SOURCE QUALITY CONTROL

- A. Production tests each unit according to NEMA ST 20.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive transformers for compliance with installation tolerances, ventilation requirements and other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify mounting supports are properly sized and located, including concealed support bracing in walls.

3.02 INSTALLATION

- A. Set transformer plumb and level.
- B. Verify continuity and tightness of ground connections.
- C. Provide grounding electrode, grounding electrode conductor, and bonding jumper required for separately derived system per NEC Article 250-30.
- D. Install indoor and outdoor transformers on 3-1/2" minimum housekeeping pad and secure to pad with suitable concrete. Concrete shall be a minimum 3000-psi. See 26 05 48 - Seismic Controls for Electrical and Communication Work.
 1. Concrete bases shall be leveled to no more than 0.25 inches (6.35 mm) of deviation for every 3 feet (91.44 cm) in ALL directions.
 2. Contractor shall notify Resident Engineer prior to concrete pour to measure concrete base and assess base's levelness.
 3. Concrete bases shall have smooth finishes. Broom finishes are prohibited.
- E. Use flexible conduit, 2 feet (60.96 cm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- F. Anchor transformers according to Section 26 05 48 - Seismic Controls for Electrical and Communication Work.
 1. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by the manufacturer.

2. Mount floor-mounted transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
 3. Trapeze-mounted transformers are not allowed unless specifically detailed on Drawings.
- G. Obtain approval of Structural Engineer licensed in the State of Washington for all transformer installations above floor level.
- H. Provide grounding and bonding for separately derived system in accordance with Section 26 05 26 - Grounding and Article 250-30 of the National Electrical Code.

3.03 IDENTIFICATION

- A. Provide labels for enclosures and components as specified in Section 26 05 53 - Electrical Identification.
- B. Indicate transformer equipment designation, kVA rating, and primary and secondary voltage ratings.
- C. Provide warning and caution signs where indicated or required by the Authority Having Jurisdiction.

3.04 FIELD QUALITY CONTROL

- A. Perform inspections and tests listed in NETA ATS, Section 7.2.1.
- B. Measure primary and secondary voltages and make appropriate tap adjustments.
- C. Adjust buck-boost transformer connections to provide optimum voltage conditions at utilization equipment throughout the normal operating cycle of the facility.
- D. Adjust voltage regulators to provide optimum voltage at equipment served throughout the normal operating cycle of the facility.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NEMA PB 1 - Panelboards; 2011.
- E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000V or Less; 2023.
- 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 67 - Panelboards; Current Edition, Including All Revisions.
- I. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- J. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY AND NOTES TO DESIGNER

- A. Section Includes:
 - 1. Distribution panelboards 800A through 1200A.
 - 2. Lighting and appliance branch-circuit panelboards 100A through 600A.
 - 3. Load centers.
- B. All new panels shall be labeled with Arc Flash Hazard, as calculated by engineer of record.
- C. When the design includes circuiting to panelboards that are old and in poor condition, panel shall be replaced as part of the design with a new 54 circuit panelboard with main circuit breaker.
- D. New panelboards shall have minimum 42 circuits.
- E. Schedules for specific panels may be available from Port of Tacoma.
 - 1. Designer will submit electronic version of panel schedules at 100% Design.
- F. Designer will include standard panelboard door-in-door detail in project drawings.
 - 1. Detail shall include complete text in compliance with standards for all phenolic labels.
- G. Main Circuit Breaker is required for all panelboards.
- H. Panelboards shall have individual feeds.

- I. Fully rated panelboards are standard. No series rated panelboards are allowed.
- J. Circuit breakers are the standard protective device for mains and branch circuits unless fuses are required for interrupting high fault currents.
- K. 200% neutral bus is required for panels serving predominantly computer loads, sensitive electronic loads, lighting with electronic ballasts variable frequency drives and other non-linear loads.
- L. Surge Protective Devices is required for panels serving predominantly computer loads and sensitive electronic loads.
- M. Panelboard shall have a minimum of 25% spare breaker capacity and 30% spare load capacity. 50% spare breaker and load capacity is preferred.

1.04 DEFINITIONS

- A. SPD: Surge Protective Device

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA EN 10250, Type 4X.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.
 - 8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graph paper; include selectable ranges for each type of overcurrent protective device.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field Quality-Control Reports:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules:
1. Panelboard schedules shall be to Port of Tacoma standard panel schedule in Microsoft Excel format
 2. This schedule shall be updated with as-built information upon the completion of the project. The contractor shall post a hard copy of the revised panel schedule in any panel modified and submit an electronic copy of the panel schedule.

1.07 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 26 01 00 "Operation and Maintenance Manuals," include the following:
1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.
- B. Panelboard Schedules: Provide panel schedules accurately representing as-built conditions.
1. Provide hard copies for installation in panelboards. Submit final versions after load balancing.
 2. Provide electronic copies in Port standard Excel format upon project completion.
 3. Panel schedules must include the date of panel or circuit installation.

1.08 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Keys: Two spares for each type of panelboard cabinet lock.
 2. Touch-up Paint: One pint container of paint matching enclosure finish packaged with protective covering for storage and identified with labels.

1.09 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Verify that product submitted will fit in space shown on drawings and meet NEC working clearance requirements.

- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with UL 67, UL 50 and NEMA PB 1.
- F. Comply with NFPA 70.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation if required by storage conditions.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.11 PROJECT CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 degrees Fahrenheit (-5 degrees Celsius) to 104 degrees Fahrenheit (40 degrees Celsius).
 - b. Altitude: Not exceeding 1000 feet (30480 cm).

1.12 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.13 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces for area.
- B. Main Circuit Breaker: Required for all panelboards that are not located in the same room as the source panel, or that are serving a specific tenant or user group.
- C. Enclosures: NEMA 4X Door-in-Door surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA EN 10250, Type 4X.

- b. Corrosive Locations: NEMA 4X.
 - 2. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Two locks required. Full size door allowing access to interior of panel shall have maintenance master keyed lock. Smaller door allowing access to circuit breaker handles shall also have a lock keyed for access by maintenance. Depending on the use group and area, this door may remain unlocked for user group access to the circuit breakers or maintenance may optionally keep this door locked. Special locks from Maintenance shall be added to the panel.
 - 3. Panel door in door covers shall have a continuous 316 SS piano hinge for 110 degree opening minimum.
 - 4. Directory Card: Inside panelboard door, mounted in welded metal frame with transparent protective cover. Card shall contain the computer printed copy of the panel schedule.
- D. Phase, Neutral, and Ground Buses:
- 1. Material: Hard-drawn copper, 98 percent conductivity, silver plated.
 - 2. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box. Provide where required by sensitive loads.
 - 3. Neutral Bus: 100% rated.
 - 4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus for panelboards with predominantly computer loads, sensitive electronic loads, lighting with electronic ballasts variable frequency drives and other non-linear loads.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
- 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Mechanical type.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
 - 4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 6. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.
- G. Future Devices: Provide approximately 25% spare breakers of the size most used in the panel and 30% space for future load growth.
- H. Panelboards shall be fully rated. Manufacturer documentation shall be permanently affixed to the surface of the panelboard indicating circuit breaker types.
- I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assure that panelboard interrupting ratings exceed present and expected future available fault currents. No series rated breakers allowed.

2.02 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- B. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. EATON
 - 2. ABB
 - 3. Schneider
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- D. Door in Door: Concealed hinges; secured with flush SS latch with tumbler lock; keyed alike.
- E. Provide minimum 42 breaker spaces in branch circuit panels.

2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Provide products by panelboard manufacturer.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time time adjustments.
 - c. Ground-fault pickup level, time delay, and I_{2t} response.
 - 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - 5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip) where required.

6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip) where required.
7. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Ground-Fault Protection: Integrally mounted or remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator, where required by engineering considerations
 - d. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage, where required by engineering considerations.
 - e. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay as required by engineer of record.
 - f. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
 - g. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
 - h. Multipole units enclosed in a single housing or factory assembled to operate as a single unit where required by engineer of record.
 - i. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

2.05 ACCESSORY COMPONENTS AND FEATURES

- A. Shunt trip breakers for load management purposes. 120-V trip coil energized from separate circuit.
- B. Transient Voltage Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.
- C. Ground Fault Circuit Interrupter (GFCI) circuit breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- D. Feed-through lugs
- E. Double main lugs
- F. Adjustable trips where engineered coordination settings are provided.

PART 3 - INSTALLATION

3.01 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PANELBOARD INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Surface mounted panelboard fronts shall have same dimensions as enclosure.
- C. Wall Mounted Panelboards: Top of trim shall be 72" above finished floor for Lighting and Appliance Panelboards.
- D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- E. Highest operating handle for Distribution panelboards shall be 78" or less.
- F. Floor Mounted Panels: Install panelboards on concrete bases, 3-1/2 inch (89 mm) nominal thickness. Concrete shall be rated for minimum 3000 psi (20684.28 kPa).
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
 - 2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to panelboards.
 - 5. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- G. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- H. Comply with mounting and anchoring requirements specified.
- I. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- J. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- K. Where flush mounted panelboards are below accessible ceilings, provide six 1-inch empty conduits from top of panelboard into accessible ceiling space for future branch circuit conductors. (This may not apply if there is little or no possibility of additional load on panels).
- L. Torque main lugs per manufacturer's recommendations. When manufacturer recommendations are unavailable, use UL 486A and UL 486B for torque values. Place a spot of red paint on lugs after torquing such that paint will be visibly disturbed if lugs are disturbed.
- M. Current Transformers: Securely support CTs so that transformer leads are not bearing weight and are not under pressure.
- N. Comply with NECA 1.
- O. Areas accessible to non-electrical staff in non-finished areas shall have the code required working clearance areas painted in front of the panel on the concrete floor.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 05 53 "Electrical Identification."

- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; describe branch circuits as to the type of load and location using room numbers, column lines or other easily recognizable descriptions. Obtain approval from maintenance department before installing. Use a computer to create directory; handwritten directories are not acceptable. Include date of last changes made and name of individual and firm making changes.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 " Electrical Identification."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53 " Electrical Identification."
- E. Provide the following placard at each panelboard:
 - 1. "NOTIFY AV MAINTENANCE IMMEDIATELY IF ANY CIRCUIT BREAKER TRIPS OR CIRCUIT LOADS NEED TO BE ALTERED".
- F. Provide Arc Flash Hazard label on panelboard. Label shall include the following information: Date of study, Engineer of Record, Arc Flash Level and Port of Tacoma Representative initial.

3.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Acceptance Testing Preparation:
 - 1. Megger test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Verify continuity and tightness of ground connections.
 - 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 4. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: The Port shall have the option of performing its own infrared inspection.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- D. Panelboards will be considered defective if they do not pass tests and inspections.

- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action. Submit test and inspection reports.

3.05 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified.
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference exceeding 10 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- B. NEMA ICS 4 - Application Guideline for Terminal Blocks; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 SUMMARY OF WORK

- A. The extent and location of "Cabinets and Enclosures" Work is shown in the Contract Documents. This section includes hinged cover enclosures, cabinets, terminal blocks, and accessories.

1.03 GOVERNING CODES, STANDARDS AND REFERENCES

- A. NECA (National Electrical Contractors Association) - National Electrical Installation Standards
- B. NEMA EN 10250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum)
- C. NEMA ICS 4 (National Electrical Manufacturers Association) – Application Guideline for Terminal Blocks.
- D. NFPA 70 (National Fire Protection Association) - National Electrical Code

1.04 SUBMITTALS

- A. Submit materials data in accordance with Section 01 33 00 – Submittals Procedures. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.
- B. Submittals shall include the following:
 - 1. Product Data: For enclosures, cabinets, and terminal blocks.
 - 2. Manufacturer's Installation Instructions, including storage, handling, protection, examination, preparation, and installation of product.
 - 3. Shop Drawings: Include layout drawings showing components and wiring for nonstandard enclosures, and cabinets.

1.05 QUALITY ASSURANCE

- A. Listing and Labeling: Provide products that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for intended use for the location and environment in which they are installed.
- B. Comply with NECA's "National Electrical Installation Standards."
- C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

1.06 EXTRA MATERIALS

- A. Spare and extra parts shall be identified for all products, but not provided. Include spare parts information in Operation and Maintenance Manual

PART 2 - PRODUCTS

2.01 HINGED COVER ENCLOSURES

- A. Construction: NEMA EN 10250, Type 12, except as noted below, with continuous hinge cover and flush latch. Key latch to match panelboards.
 - 1. Metal Enclosures: Painted Galvanized Steel
 - 2. Nonmetallic Enclosures: PVC or fiberglass, finished inside with radio- frequency-resistant paint.
 - 3. Application in other than NEMA EN 10250, Type 12 environments:
 - a. Outdoor, Damp or Wet Locations: NEMA 4X Stainless Steel
 - b. Outdoor dirty/oily and washdown locations such as Aircraft Operations Areas: NEMA 4, stainless steel.
 - c. Damp or Wet and Corrosive Locations: NEMA EN 10250, Type 4X, stainless steel.

2.02 CABINETS

- A. Cabinets: NEMA EN 10250, Type 12, except as noted below, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 1. 316 SS Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards.
 - 2. Include metal barriers to separate wiring of different systems and voltage.
 - 3. Include accessory feet where required for freestanding equipment.
 - 4. Application in other than NEMA EN 10250, Type 12 environments:
 - a. Outdoor, Damp or Wet Locations: NEMA 4X, stainless steel
 - b. Outdoor dirty/oily and washdown locations such as Aircraft Operations Areas: NEMA 4X, stainless steel.
 - c. Damp or Wet and Corrosive Locations: NEMA EN 10250, Type 4X, stainless steel.

2.03 TERMINAL BLOCKS

- A. Minimum 600-volt rating for 480-volt circuits.
- B. Clamp or screw terminals sized for maximum conductor size.
- C. Separate connection point for each conductor.
- D. Ten percent spare terminal points.
- E. Individual identification for each terminal block.
- F. Phenolic block separators or barriers to isolate low-voltage and control terminations from analog and DC circuits.
- G. Terminal Blocks: NEMA ICS 4.
- H. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.

- I. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
- J. Provide ground bus terminal block, with each connector bonded to enclosure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive enclosures, and cabinets for compliance with installation tolerances, access and working clearances. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 EXISTING WORK

- A. Remove abandoned cabinets and enclosures. Patch surfaces.
- B. Maintain access to existing cabinets and enclosures and other installations which remain active and which require access. Modify installation to provide access as appropriate.
- C. Extend existing cabinets and enclosures using materials and methods as specified.
- D. Clean and repair existing cabinets and enclosures which remain or are to be reinstalled.

3.03 INSTALLATION

- A. Install enclosures and cabinets as indicated, according to manufacturer's written instructions and in accordance with NECA "National Electrical Installation Standards."
- B. Install enclosures and cabinets plumb and level. Anchor securely.

3.04 IDENTIFICATION

- A. Provide labels for enclosures and components as specified in Section 26 05 53 - Electrical Identification.
- B. Control Panels: Include panel designation, power source location, panel designation and circuit number.
- C. Equipment used in emergency systems shall be labeled "Suitable for use on emergency systems" per NEC 700-3.
- D. Instructional signs: Install approved legend where instructions or explanations are required for system or equipment operation.

3.05 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
 - 1. Repair damage to finishes recommended by manufacturer.

3.06 CLEANING

- A. On completion of installation, clean electrical parts and remove conductive and harmful materials
- B. Remove dirt and debris from enclosure.
- C. Clean finishes and touch up damage.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 SUMMARY OF WORK

- A. The extent and location of "Fuses" Work is shown in the Contract Documents. This section includes cartridge fuses, rated 600V and less, for use in switches, panelboards, switchboards, controllers, and motor-control centers; and spare fuse cabinets.

1.03 GOVERNING CODES, STANDARDS AND REFERENCES

- A. NEMA FU 1 (National Electrical Manufacturers Association) - Low Voltage Cartridge Fuses,
- B. NFPA 70 (National Fire Protection Association) - National Electrical Code,

1.04 SUBMITTALS

- A. Submit materials data in accordance with Section 01 33 00 - Submittals. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.
- B. Submittals shall include the following:
 - 1. Product Data: Include the following for each fuse type indicated:
 - a. Ambient Temperature Adjustment Information: If rating of fuses has been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - 1) For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature and adjusted fuse rating.
 - 2) Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
 - b. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - c. Let-through current curves for fuses with current-limiting characteristics.
 - d. Time-current coordination curves and current-limitation curves for each type and rating of fuse. Coordination charts and tables, and related data.
 - e. Fuse size for elevator feeders and elevator disconnect switches.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Provide fuses from a single manufacturer.
- B. On low-voltage systems, provide nonrenewable cartridge fuses, class and current rating required, voltage rating consistent with circuit voltage.
- C. Listing and Labeling: Provide components, devices and accessories that are Listed and Labeled as defined in NFPA 70, Article 100 and marked for intended use for the location and environment in which they are installed.
- D. Comply with NEMA FU 1.
- E. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

1.06 COORDINATION

- A. Coordinate fuse ratings with HVAC and refrigeration equipment nameplate limitations of maximum fuse size.
- B. Select fuses to provide appropriate levels of short circuit and overcurrent protection for components such as wire and cable, bus structures, and other overcurrent equipment.
- C. Select fuses to coordinate with time-current characteristics of other overcurrent protective elements, such as other fuses, circuit breakers, and protective relays. Design system to ensure that device closest to fault operates first.
- D. The Engineer shall verify that the let-through current of the selected fuse does not exceed the rating of downstream devices or conductors. The Engineer shall calculate the short-circuit capability of downstream cable to verify that it is protected by the fuse time-current characteristic curve.
- E. The Engineer shall selectively coordinate all protective devices so faults are isolated to the most localized level.
 - 1. On low voltage systems this may occasionally indicate the use of a fuse in series with a circuit breaker.
 - 2. On medium voltage systems, particular care should be given to coordination of padmount vacuum fault interrupters with upstream feeder fuses and coordination of fuses in series through a transformer (i.e. a 12.47-4.12kV transformer with primary and secondary fuses).

1.07 EXTRA MATERIALS

- A. Spare and extra parts shall be identified for all products, but not provided. Include spare parts information in Operation and Maintenance Manuals.
 - 1. 3 of each fuse type and size

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Bussmann; Division of Cooper Industries.
 - 2. Ferraz Shawmut.
 - 3. Littelfuse.
 - 4. Or Approved Equal.

2.02 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, non-renewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

2.03 LOW-VOLTAGE FUSES

- A. Fuses for circuits under 600V shall be UL listed, Class J, Class L, Class R or RK.
- B. Fuses for safety switches shall be class R, intended for use with rejection clips.
 - 1. Use Class L and Class T fuses to protect loads over 600 Amps such as transformer secondaries, switchboard mains or large feeders

2. Use Class J, Class K and Class R fuses to protect most feeder and branch-circuit applications.

C. Fuse Applications:

1. Main Services and Main Feeders
 - a. 601 to 6000A circuits: Provide Class L with 4-second minimum time delay at 500% rated current, with an interrupting rating of 200,000 amperes RMS symmetrical.
 - b. 600 amperes and less circuits: Provide Class RK1 dual-element, time-delay, non-interchangeable fuses with an interrupting rating of 200,000 amperes, for 600 volt and 250-volt applications, respectively.
 - c. 600-volt RK1 fuses shall have an indicating feature, which clearly indicates when fuse is opened (blown).
2. Motor Circuit Fuses: Provide Class RK1 and Class J dual-element time-delay fuses with 10-second minimum time delay at 500% rated current, sized at 125% of full-load current of motor.
3. Current limiting fuses Protecting Molded-Case Circuit Breaker Panelboards
 - a. Molded case circuit breaker panelboards, having short-circuit ratings less than the available short-circuit current at the point where the panelboard is applied, shall be protected by Class and maximum fuse ratings listed by the panelboard manufacturer.
 - b. Class G (300V) and Class CC (600V) current limiting, noninterchangeable, time delay or non-time delay fuses are used in branch-circuit panelboards.
4. Lighting Fixture Protection
 - a. Lighting fixture ballasts shall be individually protected on their line.
 - b. In each instance, fuse size and type shall be as recommended by the fixture or ballast manufacturer.

2.04 POTENTIAL TRANSFORMER FUSES

- A. Medium-voltage fuses shall be E-Rated, intended for the purpose. Low-voltage fuses shall be as selected by the original equipment manufacturer.

2.05 SPARE FUSE CABINET

- A. Cabinet: Wall-mounted, 0.05-inch- thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
 2. Finish: Gray, baked enamel.
 3. Identification: "SPARE FUSES" in 1-1/2-inch high letters on exterior of door.
 4. Fuse Pullers: For each size fuse.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 FUSE APPLICATIONS

- A. Main Services and Main Feeders:
 - 1. 601A to 6000A circuits: Class L, minimum 4 second time delay at 500% rated current, with an interrupting rating of 200,000 amperes RMS symmetrical.
 - 2. 600A and less circuits: Class RK1 dual-element, time delay, non-interchangeable fuses with an interrupting rating of 200,000 amperes, for 600V and 250V applications.
 - a. 600V RK1 fuses shall have an indicating feature which clearly indicates when fuse is opened (blown).
- B. Motor Branch Circuits: Class RK1 and Class J dual element time-delay fuses with 10-second minimum time delay at 500% rated current, sized at 125% of full load current of motor.
- C. Current Limiting Fuses Protecting Molded Case Circuit Breaker Panelboards:
 - 1. Molded case circuit breaker panelboards having short circuit ratings less than the available short circuit current at the point where the panelboard is applied shall be protected by Class and maximum fuse ratings listed by the panelboard manufacturer.
 - 2. Class G (300V) and Class CC (600V) current limiting, non-interchangeable time delay or non-time delay fuses are used in branch circuit panelboards.
- D. Light Fixture Protection:
 - 1. Luminaire ballasts shall be individually protected on their line.
 - 2. In each instance, fuse size and type shall be as recommended by the fixture or ballast manufacturer.

3.03 FUSE INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so that manufacturer, type and rating information is readable without removing fuse. Do not mix brands of types of fuses in device.
- B. The Electrical Contractor at the job site shall install all fuses only when equipment is to be energized. Fuses shall not be installed prior to shipment.
- C. Install spare fuse cabinets.

3.04 IDENTIFICATION

- A. Install labels indicating fuse replacement information on inside door of each fused switch as specified in Section 26 05 53 - Electrical Identification.

END OF SECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- C. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

1.02 SUMMARY OF WORK

- A. The extent and location of “Enclosed Switches and Circuit Breakers” Work is shown in the Contract Documents. This section includes individually mounted enclosed switches and circuit breakers used for the following:
 - 1. Service disconnecting means.
 - 2. Feeder and branch-circuit protection.
 - 3. Motor and equipment disconnecting means.
- B. Definitions
 - 1. GFCI: Ground-fault circuit interrupter.
 - 2. RMS: Root mean square.
 - 3. SPDT: Single pole, double throw.

1.03 GOVERNING CODES, STANDARDS AND REFERENCES

- A. NEMA AB 1 (National Electrical Manufacturers Association) - Molded Case Circuit Breakers.
- B. NEMA FU1 (National Electrical Contractors Association) - Low Voltage Cartridge Fuses.
- C. NEMA KS 1 (National Electrical Contractors Association) - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- D. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
- E. NFPA 70 (National Fire Protection Association) - National Electrical Code.

1.04 SUBMITTALS

- A. Submit materials data in accordance with Section 01 33 00 - Submittals. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products.
- B. Submittals shall include the following:

1. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
2. Shop Drawings: For each switch and circuit breaker.
 - a. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - 1) Enclosure types and details for types other than NEMA EN 10250, Type 1.
 - 2) Current and voltage ratings.
 - 3) Short-circuit current rating.
 - 4) Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 5) Include time-current coordination curves for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.
3. Manufacturer Seismic Qualification Certification: Submit certification that enclosed switches and circuit breakers, accessories, and components will withstand seismic forces defined in Section 26 05 48 - Seismic Controls for Electrical and Communication Work. Include the following:
 - a. Basis of Certification: Verify whether withstand certification is based on actual test of assembled components.
 - 1) The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Field Test Reports: Submit written test reports and include the following:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
5. Manufacturer's field service report.
6. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 1 General Requirements. In addition to requirements specified in Section 01 70 00 - Project Closeout include the following:
 - a. Routine maintenance requirements for components.
 - b. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.

- c. Time-current curves, including selectable ranges for each type of circuit breaker.

1.05 QUALITY ASSURANCE

- A. Listing and Labeling: Provide components, devices and accessories that are Listed and Labeled as defined in NFPA 70, Article 100 and marked for intended use for the location and environment in which they are installed.
 - 1. Service Entrance: Switches and circuit breakers identified for use as service equipment shall be labeled for this application.
- B. Comply with NEMA AB 1 and NEMA KS 1.
- C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.
- D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22°F (minus 30°C) and not exceeding 104°F (40°C).
 - 2. Altitude: Not exceeding 1000 feet (30480 cm).

1.07 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.08 EXTRA MATERIALS

- A. Spare and extra parts shall be identified for all products, but not provided. Include spare parts information in Operation and Maintenance Manuals.
 - 1. Potential Transformer Fuses: 3 of each type and rating installed.
 - 2. Control-Power Fuses: 3 of each type and rating installed.
 - 3. Fuses and Fusible Devices for Fused Circuit Breakers: 3 of each type and rating installed.
 - 4. Fuses for Fused Switches: 3 of each type and rating installed.
 - 5. Fuses for Fused Power-Circuit Devices: 3 of each type and rating installed.
 - 6. Spare Indicating Lights: 2 of each type installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cutler-Hammer; Division of Eaton.
 - 2. General Electric.

3. Square D.; Schneider Electric.
4. Siemens.
5. Or Approved Equal.

2.02 COMPLIANCE

- A. Seismic: Refer to Section 26 05 48 – Seismic Controls for Electrical and Communication Work

2.03 ENCLOSED SWITCHES

- A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.
- B. Enclosed, Fusible Switch, 800A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handles with two padlocks, and interlocked with cover in closed position.
- C. Service Entrance: For switches identified for use as service equipment, provide solid neutral assembly and equipment ground bus.

2.04 ENCLOSED CIRCUIT BREAKERS

- A. Enclosed Circuit Breakers
 1. Ground Fault protection type:
 - a. Required for solidly grounded wye service entrance switches over 150 Volts to ground, not exceeding 600 Volts and rated 1000 Amps and above.
 2. Switch Duty (SWD) rated type for switching lighting fixtures. Note that energy code restricts use of circuit breakers as sole means of switching lighting circuits. (See State of Washington Nonresidential Energy Code 1513.2)
 3. Auxiliary contacts: Provide as required by engineering considerations.
- B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I²t response.
 4. Current-Limiting Circuit Breakers: Frame sizes 400A and smaller; let-through ratings less than NEMA FU 1, RK-5.

5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
 6. GFCI Circuit Breakers: Single- and two-pole configurations with 30 mA trip sensitivity.
 7. Molded-Case Switch: Molded-case circuit breaker without trip units.
- C. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
1. Lugs: Mechanical style suitable for number, size, trip ratings, and material of conductors.
 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
 3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 4. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system.
 5. Shunt Trip: 120V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
 6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 7. Auxiliary Switch: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 8. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
 9. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
- D. Service Entrance: For enclosed circuit breakers identified for use as service equipment, provide solid neutral assembly and equipment ground bus.

2.05 ENCLOSURES

- A. NEMA AB 1, NEMA KS 1 and UL 50 to meet environmental conditions of installed location.
1. Indoor Clean Locations: NEMA EN 10250, Type 1.
 2. Indoor Dusty Locations: NEMA EN 10250, Type 12.
 3. Indoor Wet or Damp Locations and Outdoor Dirty/Oily or Washdown Locations: NEMA EN 10250, Type 4.
 4. Outdoor Locations: NEMA EN 10250, Type 3R.
 5. Corrosive Locations: NEMA EN 10250, Type 4X, stainless steel.

2.06 FACTORY FINISHES

- A. Manufacturer's standard prime-coat finish ready for field painting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EQUIPMENT INSTALLATION

- A. Comply with NFPA 70 working space requirements and NECA 1.
- B. Standard Mounting Height: Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated. Operating handle typically at 5'-0" above grade or finished floor.
- C. Mount on substantial structure and secure to meet seismic zone 3 requirements. Comply with mounting and anchoring requirements specified in Section 26 05 48 - Seismic Controls for Electrical and Communication Work.
- D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses with rating indications facing outward.
- F. Set adjustable parameters and provide testing and calibration as required by engineering considerations.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 26 05 53 - Electrical Identification.
- B. Install enclosure nameplate with switch or circuit breaker designation, power source, source location, voltage, load served and load location.
 - 1. Identify special conditions for shutting down load served.
- C. Apply label inside door cover identifying NEMA fuse class and size of fuses installed.
- D. Equipment used in emergency systems shall be labeled "Suitable for use on emergency systems" per NEC 700-3.

3.04 CONNECTIONS

- A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.
- B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
 - 1. Mark lugs after torquing with red paint such that paint will be visibly disturbed if lugs are disturbed.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to initially inspect, test, and adjust components, assemblies, and equipment installations, including connections. Verification will be by third party testing agency.
- B. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each enclosed switch, circuit breaker, component, and control circuit.
 - 2. Test continuity of each line- and load-side circuit.
- C. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.06 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable switches and circuit-breaker trip ranges.

3.07 CLEANING

- A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes Transient Voltage Surge Suppression (TVSS) referred herein as Surge Suppression Device (SPD) for applications 600 Volts & below.

1.02 RELATED DOCUMENTATION

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 26 Section "Panelboards"

1.03 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.
- B. VPR: Voltage Protection Rating.
- C. SPD: Surge Protective Device, replacement acronym for TVSS: Transient Voltage Surge Suppressor
- D. CLF: Component Level Fusing
- E. LIC: Low Impedance Cable
- F. SCCR: Short Circuit Current Rating
- G. LTV: Let Through Voltage

1.04 STANDARDS

- A. All manufacturers must comply with the standards listed below and any additions current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.
 - 1. Underwriters Laboratories 1449 – (((UL 1449))) 3rd Edition
 - 2. NEC article 285. National Electrical Code 2008
 - 3. NFPA 780 Standard for the installation of lightning protection systems
 - 4. UL 96A – Lightning Protection System Master Label
 - 5. IEEE (Institute of Electrical and Electronic Engineering Inc.) Latest Revision
 - a. C62.41.1, C62.41.2, C62.45, C62.33 & C62.35
 - 6. Previous NEMA LS-1 testing standards

1.05 APPLICATIONS

- A. All Main Services and then switchgear, MCCs, distribution panels and branch panels as noted on the project's drawings and/or panel schedules.

1.06 SUBMITTALS

- A. Unless listed as "pre-approved", manufacture must have 15 day prior approval to submit on a project.

- B. The vendor/manufacturer shall submit 3 copies of all related TVSS Specifications, product data, electrical and mechanical shop drawings, installation requirements/instructions, maintenance manuals (if applicable) and performance/warranty information requested in this document for the actual proposed TVSS/SPD device(s) to Project Engineer. All information shall be submitted in a three ring binder indexed by response and test. Project Engineer reserves the right to select or reject any vendor response or product.
- C. In order for TVSS device to be considered for this project, all responses to information requested in this specification must be provided in writing and must reference each specification section and sub-section herein. Attach information as necessary to provide compliance with specification response requirements. If a manufacturer cannot fully comply with a section of the specification, this must be stated in the response and the reason for non-compliance shall be provided.
- D. All specs, listings and warranty information must be included on the manufacture’s published product cut/spec sheets (unless noted otherwise) to be considered relevant for review.

1.07 COORDINATION

- A. Coordinate surge protective devices with Division 26 Section “Panelboards”.

1.08 QUALITY ASSURANCE

- A. Warranty:
 - 1. SPD Manufacturer’s Warranty: shall provide a product warranty for a period of not less than thirty (30) years from date of installation. Warranty shall cover unlimited, complete replacement of TVSS devices during the warranty period with no exceptions for lightning, utility accidents etc.
 - 2. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Experience: Those firms responding to this specification shall provide proof that they have been regularly engaged in the design, manufacturing and testing of TVSS for not less than five (5) years.
- C. Continuity: All SPDs for this project must be supplied by the same manufacture.

PART 2 - PRODUCTS

2.01 ACCEPTABLE “PRE-APPROVED” MANUFACTURES/MODELS

- A. Total Protection Solutions – Contact “Power Solutions NW” (206) 930-1980 or approved equal.

Total Protection Solutions (TPS) Service Track & Low Profile Series					
Voltage	480Y277v	480v	208Y120v	208v	120/240v
Application	3 Phase Wye	3 Phase Delta	3 Phase Wye	3 Phase	Single / Split Phase

				Delta	
Main Services ≥ 4,000 Amps	ST400-3Y480-FL	ST400- 480NN-FL	ST400-3Y208-FL	ST400-240NN-FL	ST400-1S240-FL
Main Services 2,000 – 3,999 A	ST300-3Y480-FL	ST300- 480NN-FL	ST300-3Y208-FL	ST300-240NN-FL	ST300-1S240-FL
Main Services < 2,000 Amps	ST240-3Y480-FL	ST240- 480NN-FL	ST240-3Y208-FL	ST240-240NN-FL	ST240-1S240-FL
Distribution, MCC & Branch Panels	LP120-3Y480-FL	ST120- 480NN-FL	LP120-3Y208-FL	ST120-240NN-FL	LP120-1S240-FL
Use Delta units for all unbonded/ungrounded & high resistance ground Wye applications.					

B. Liebert – Contact “Campbell Company” (206) 763-5000 or approved equal.

Liebert Interceptor II Series					
Voltage	480Y277v	480v	208Y120v	208v	120/240v
Application	3 Phase Wye	3 Phase Delta	3 Phase Wye	3 Phase Delta	Single / Split Phase
Main Services	SI040-277YANSE	SI040-480DANSE	SI040-120YANSE	SI040-208DANSE	SI040-120SANSE

≥ 4,000 Amps					
Main Services 2,000 – 3,999 A	SI032-277YANSE	SI032-480DANSE	SI032-120YANSE	SI032-208DANSE	SI032-120SANSE
Main Services < 2,000 Amps	SI025-277YANSE	SI025-480DANSE	SI025-120YANSE	SI025-208DANSE	SI025-120SANSE
Distribution, MCC & Branch Panels	SI016-277YANSE	SI016-480DANSE	SI016-120YANSE	SI016-208DANSE	SI016-120SANSE
Use Delta units for all unbonded/ungrounded & high resistance ground Wye applications.					

C. Current Technology – Contact “Integrated Power Systems” (425) 450-0051, or approved equal.

Current Technology TransGuard Series					
Voltage	480Y277v	480v	208Y120v	208v	120/240v
Application	3 Phase Wye	3 Phase Delta	3 Phase Wye	3 Phase Delta	Single / Split Phase
Main Services ≥ 4,000 Amps	TG-200-277/480-3GY-M-L2	TG-200-480-DG-M-L2	TG-200-120/208-3GY-M-L2	TG-200-208-3DG-M-L2	TG-200-120/240-2G-M-L2
Main Services 2,000 – 3,999 A	TG-150-277/480-3GY-M-L2	TG-150-480-DG-M-L2	TG-150-120/208-3GY-M-L2	TG-150-208-3DG-M-L2	TG-150-120/240-2G-M-L2

Main Services < 2,000 Amps	TG-125-277/480-3GY-M-L2	TG-125-480-DG-M-L2	TG-125-120/208-3GY-M-L2	TG-125-208-3DG-M-L2	TG-125-120/240-2G-M-L2
Distribution, MCC & Branch Panels	TG-60-277/480-3GY-M-L2	TG-60-480-DG-M-L2	TG-60-120/208-3GY-M-L2	TG-60-208-3DG-M-L2	TG-60-120/240-2G-M-L2
Use Delta units for all unbonded/ungrounded & high resistance ground Wye applications.					

- D. Low Impedance Cable: Required for all installations with lead lengths over 36"
1. Total Protection Solutions (TPS)
 - a. Main Services – LIC-6X-xx
 - b. All other applications – LIC-10X-xx
 - c. (Where xx denotes length in feet; 5', 10', 15')
 2. Liebert – Not available, use low impedance cable from TPS or Current Technology
 3. Current Technology
 - a. Main Services – HPI-6Y-xx
 - b. All other applications – HPI-10Y-xx
 - c. (Where xx denotes length in feet; 5', 10', 15')

2.02 SURGE CURRENT RATINGS: MINIMUM SINGLE IMPULSE RATINGS WITH INDEPENDENT TESTING PER PREVIOUS NEMA LS1.

Main Services ≥ 4,000 Amps	400kA per Phase, 200kA per Mode
Main Services 2,000 – 3,999 Amps	300kA per Phase, 150kA per Mode
Main Services < 2,000 Amps	240kA per Phase, 120kA per Mode
Distribution, MCC & Branch Panels	120kA per Phase, 60kA per Mode

2.03 TYPE:

- A. A. Internal, non-modular SPD/TVSS required for all applications (integrated with gear/panels) connected in parallel to panelboard via dedicated circuit breaker.

2.04 LISTINGS: UL 1449 3RD EDITION, UL 96A & NFPA 780 (OR CURRENT REVISION):

- A. Type 1 & 2: Suitable for applications including direct buss connection with no additional overcurrent protection requirements.
- B. Nominal Discharge Current (In): 20kA for Main Service (for compliance to UL 96A Lightning Protection Master Label and ((NFPA 780))) and 10kA for all other applications.
- C. SCCR: 200KA Short Circuit Current Rating with no additional/external overcurrent protection.

2.05 MODES OF PROTECTION - ALL MODES FOR ALL CONFIGURATIONS AND:

- A. WYE: Discrete MOV Line to Neutral, Line to Ground & Neutral to Ground
- B. Delta: Discrete MOV Line to Line & Line to Ground
- C. Sinewave tracking transient filter protection for all modes Wye & L-L for Delta.

2.06 LOW IMPEDANCE CABLE (LIC):

- A. An LIC should be available from the SPD manufacture that reduces effective lead impedance by 75%, and be used for all SPD installations with lead lengths exceeding 36".

2.07 DURABILITY TESTING

- A. A. SPD/TVSS devices shall withstand a minimum of 5,000 hits delivered at a rate of one pulse per minute. Unit shall not fail or suffer let through voltage degradation of more than 7%. lead length for testing and let through measurements shall be 6".

2.08 COMPONENT LEVEL FUSING

- A. Balanced array MOV based SPD/TVSS with individual Component Level Fusing (Oxygen Free High Conductivity OFHC elements in silica sand) are required for all components.

2.09 SPD MUST NOT HAVE, USE OR REQUIRE ANY OF THE FOLLOWING:

- A. Board trace fuses, crowbar type gas tube arrestors or SAD devices are not allowed.
- B. Integrated primary overcurrent protection Fuses or Circuit Breakers are not allowed.
- C. SPDs with external over-current protection requirements (UL Type-2 listing only) are not allowed.

2.10 SAFETY

- A. SPD must not fail catastrophically when a continuous over-voltage is applied to 6 modes simultaneously (Line-Neutral & Line-Ground * 3 Phases). UL 1449 only requires one mode be tested at a time.

2.11 MONITORING

- A. Green "Phase Status" LEDs, Red "Service Required" LED, Dry Contacts & Audible Alarm w/silence button are required. SPD must not rely solely on primary overcurrent protection (no CLF), as this will likely open up on SPD failure, thus disabling the alarm (no power, no alarm).

2.12 SERVICE CONDITIONS

1. SPDs shall be rated for continuous operation under the following conditions, unless otherwise indicated:
 - B. Maximum Continuous Operating Voltage (MCOV) above nominal – Minimum 115%.
 - C. Enclosures: Heavy duty, powder coated steel with appropriate NEMA rating for application.
 - D. Operating Temperature: 30 to 120 degrees Fahrenheit (48.89 degrees Celsius).
 - E. Humidity: 0 to 85 percent, non-condensing.
 - F. Altitude: Up to 13,000 feet (396240 cm) above sea level.
 - G. Noise Level: SPD shall not emit any audible noise unless “in alarm” indicating a “service required” condition.

2.13 MAXIMUM LET THROUGH VOLTAGES (LTV) – TESTED W/6” LEADS & 500MHZ SCOPE FROM 0 REF PER NEMA-LS1

1. MAIN SERVICE APPLICATIONS

Voltage Configuration	Test Waveform	L-N	L-G	L-L	N-G	Phase °
480/277 Wye	IEEE C3 – 20 kV/10ka	1187	1540	1950	1500	90°
	UL VPR – 6 kV/3kA	1200	1200	1800	1200	90°
	IEEE A1 – 2kV – 67A	44	77	54	52	180°
120/208 Wye	IEEE C3 – 20 kV/10kA	907	1173	1267	1090	90°
	UL VPR – 6 kV/3kA	800	800	1200	800	90°
	IEEE A1 – 2kV – 67A	40	76	54	46	180°

MCC, DISTRIBUTION & BRANCH PANEL APPLICATIONS

Voltage Configuration	Test Waveform	L-N	L-G	L-L	N-G	Phase °
480/277 Wye	UL VPR – 6 kV/3kA	1200	1200	2000	1200	90°
		71	119	73	67	180°

	IEEE A3 – 6kV – 200A					
	IEEE A1 – 2kV – 67A	27	52	39	48	180°
120/208 Wye	UL VPR - 6kV/3kA	700	700	1200	700	90°
	IEEE A3 - 6kV - 200A	56	81	88	112	180°
	IEEE A1 - 2kV - 67A	29	46	39	40	180°

PART 3 - EXECUTION

3.01 PRE-INSTALLATION

- A. Training: Onsite installation training for the contractor must be provided by the SPD supplier for all project located in the greater Puget Sound area. For projects outside of the Puget Sound area, training shall be provided by phone.
- B. Review all installation information in manufacturer’s installation manual prior to installing SPD’s

3.02 INSTALLATION

- A. **INTERRUPTION OF EXISTING ELECTRICAL SERVICE:** Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notification: Notify Construction Manager no fewer than two days in advance of proposed electrical service interruptions. Do not proceed with interruption of electrical service without Construction Manager’s written permission.
 - 2. Placing into Service: Do not energize or connect service entrance equipment, panelboards, control terminals, or data terminals to their sources until the surge protective devices are installed and connected.
- B. **GENERAL**
 - 1. Verify all voltages before connecting to avoid injury and damage to equipment.
 - 2. The SPD’s shall be installed external to switchboard, distribution and panelboard.
 - 3. Internally mounted SPD’s will not be accepted, except in substations.
 - 4. Ground resistance shall be 25 ohms or less per NEC Article 250.56
 - 5. Suppressors shall be installed per the manufacturer's installation instructions and the requirements of: the NEC, the local authority having jurisdiction and the project engineer.
 - 6. Project Engineer or their appointed representative may perform inspection of the installed suppressors and reserves the right to require corrections to the installation to comply with manufacturer’s installation requirements and project specifications.

7. The SPD/TVSS supplier must provide on-site installation training for the electrical contractor.
8. All circuit breakers feeding SPDs must have locking safety clips installed to prevent the circuit breaker from being inadvertently being turned off.

C. SERVICE ENTRANCE

1. Install one primary suppressor at each utility service entrance to the facility as indicated on the drawings and/or as noted on the panel schedules.
2. Suppressor shall be installed on the load side of the service entrance disconnecting means unless noted otherwise by the project engineer.
3. Provide a 100 Amp circuit breaker (with a safety clip to ensure the circuit breaker cannot be inadvertently turned off) in the switchboard as over-current protection for the wire and as a disconnecting means for the SPD.
 - a. Only UL 1449 Type-1 devices are allowed, so by definition of Type-1, the manufacture cannot have any external overcurrent protection requirements. If the SPD manufacture does have external overcurrent protection requirements, that SPD equipment will not be accepted.
4. Use minimum #4 AWG wire for connecting the SPD.
5. Conductors between suppressor and point of attachment shall be kept as short and straight as possible. Lead length of connecting conductor shall not exceed two (2) feet without written permission of the specifying Engineer.
6. Whenever possible, SPD leads must be twisted together and securely tie-wrapped together every 6" to reduce impedance of the leads.
7. Over-length SPD leads (greater than 36") must use Low Impedance Cable (see "Pre-Approved" section 2.0-D for ordering information)
8. SPD leads must not be spliced.
9. Suppressor's ground shall be bonded to enclosure frame and the service entrance ground bus, and conduit between the TVSS/SPD and the switchboard must provide secure electrical/mechanical connections.

D. SECONDARY SPDs FOR MCC, DISTRIBUTION & BRANCH PANELS

1. Install one secondary suppressor at each MCC, Distribution Panel, Branch Panel & Sub-Panel location as indicated on the drawings.
2. Provide a 30 Amp circuit breaker (with a safety clip to ensure the circuit breaker cannot be inadvertently turned off) in the panel being protected as over-current protection for the wire and as a disconnecting means for the SPD.
 - a. Only UL 1449 Type-1 devices are allowed, so by definition of Type-1, the manufacture cannot have any external overcurrent protection requirements. If the SPD manufacture does have external overcurrent protection requirements, that SPD equipment will not be accepted.
3. Conductors between suppressor and point of attachment to the panelboard shall be kept as short and straight as possible. Mount the TVSS directly adjacent to the circuit breaker closest to the neutral bus, such that the maximum length of all connecting wiring is kept as short as possible, not exceed 18 inches (457.2 mm).

4. Over-length SPD leads (greater than 18") must be twisted together (2 twists/foot) and securely tie- wrapped once per foot to reduce impedance of the leads. Quality compression butt-splice connections are required when extending SPD leads (wire nuts are not acceptable).
5. Grounding: Suppressor's ground lead shall be bonded to the panel enclosure with a small ground lug as close as possible to the TVSS mounting point. Conduit between the SPD/TVSS and the switchboard must provide secure electrical/mechanical connections.
 - a. Isolated Ground (IG) Applications: The ground lead is bonded to the SPDs metal enclosure, so a non-metallic conduit must be used to isolate the SPD from the panel enclosure. The ground lead must then be connected to the IG buss.
6. Multiple "Feed-Through" Panels with shared SPD/TVSS units must be immediately adjacent to each other (side by side) with short tie cables not to exceed 36". Sub-panels must be feed from a primary panel with a "lug-out", lug-in" tie connection, and the tie connection lugs must be at the same end of the primary and sub-fed panel. i.e. bottom to bottom or top to top to ensure short tie "sub-feed" cables.
 - a. Dual Panel Configurations: One SPD/TVSS per two panels
 - b. Three, Four & Five Panel Configurations: One SPD/TVSS installed on both outside panels of the multi-panel configuration, i.e. Install SPD on first (primary) and another one on the third, fourth or fifth sub-fed panel for a total of two SPDs.

3.03 FIELD QUALITY CONTROL

- A. A factory authorized representative shall inspect and photograph all SPD installations for projects located in the great Puget Sound area and report findings in writing to the project engineer. For projects outside of the greater Puget Sound area, the contractor shall provide pictures of all installations with all covers and deadfronts removed so all SPD wiring and terminations can be clearly seen. The factory rep will then assemble a written report for the project engineer.

3.04 STARTUP SERVICE

- A. Do not energize or connect service entrance equipment or panelboards to their sources until SPD's are installed and connected.
- B. Do not perform insulation resistance "Hipot" tests of the distribution wiring with the SPDs installed/connected. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2022).
- B. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric; 2017 (Reapproved 2022).

1.02 SECTION INCLUDES:

- A. Furnish all labor, materials, and equipment required to construct Fencing and Gate(s) System(s) as indicated on the drawings or specified herein. Said work must include any incidentals required to provide a finished job.
- B. This Section Includes the Following:
 - 1. Galvanized steel chain-link fences.
 - 2. Swing gates.
 - 3. Privacy slats and mesh fabric.
 - 4. Sliding cantilevered chain-link rolling gate.
 - 5. Vinyl dip coating for all fence and gate components and fabric.

1.03 EXISTING CONDITIONS:

- A. The Contractor/Installer must examine the site to determine existing conditions, extent of work and clearing operations required. Failure of the Contractor/Installer to visit the site and familiarize themselves with the existing conditions must in no way relieve them from obligations with respect to their bid or contract.

1.04 RELATED SECTIONS:

- A. Section 05 50 00 – Metal Fabrications.

1.05 QUALITY ASSURANCE:

- A. The Contractor/Installer must be experienced in color-coated chain link fencing installations. The Contractor must provide three representative local fencing projects that have been completed by them within the last three years for the Engineer's review.
- B. The Contractor/Installer must provide a warranty stating that the fencing is secure and stable, tight, corrosion-free, in proper alignment, complete in detail and finish, and free of hazardous conditions. Any defects that develop within one year from the date of Physical Completion must be replaced at the expense of the Contractor/Installer.
- C. Standard Specifications: All work must conform to all applicable requirements of the following Specifications, whether specifically referred to or not, except as specifically modified herein.
 - 1. Comply with the requirements of the American Society for Testing and Materials (ASTM) especially the ASTM Committee F-14 Standards on Fences (latest edition).
 - 2. Perform all shop and field welding in accordance with the pertinent recommendations of the American Welding Society.
 - 3. Pipe ASTM-A53.

- 4. ASTM A392.
- 5. ASTM-F626-89a.
- 6. ASTM F668-88.

1.06 SUBMITTALS

- A. The Contractor must make all product submittals and submit Shop Drawings, for approval, prior to manufacturing, describing and detailing typical line post, terminal post, gate, fabric, materials, hardware assemblies, and all proposed fence/gate alignment sections in accordance with Division 01 Specifications.
- B. The Contractor must provide certified letters from manufacturers indicating conformance with specifications, manufacturing date and lot number for all materials used on the site.

1.07 SUBSTITUTIONS AND PRODUCT OPTIONS:

- A. During bidding, all bidders must bid on the specified products.
- B. Refer to Division 1 for information about substitutions.

1.08 PRODUCT HANDLING

- A. All materials must be new and delivered to the site in an undamaged condition. Store materials off the ground and protect from damage. In the event of damage, immediately make repairs and/or replace as necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 2 - MATERIALS

2.01 GENERAL:

- A. All piping for fence and gates must be Schedule 40, hot-dipped galvanized steel, or approved equal, for size, finish, material composition, strength, appearance, performance and ease of maintainability.
- B. Galvanizing must be in accordance with ASTM F668-88. All fence fittings must comply with ASTM F 626-89a.

2.02 CHAIN LINK FENCE FABRIC:

- A. Chain link fabric must be constructed of woven 9-gauge for fencing & gates. All fabric must be W&M gauge steel wire as specified on plans and details, in a continuous 2 inch mesh. Mesh must be as specified on plans and details, with knuckled top and bottom selvage. Fabric must not be hot-dipped galvanized after weaving, per ASTM-A392. Weight of the coating must be 1.2 oz. per square foot of actual surface. Coating must be smooth, of uniform thickness, and free from dross, uncoated spots and adhered particles of foreign material. Height of fabric must be as shown on the drawings. Fabric must be installed on the storage side of posts. Lower edge of fabric must be no greater than 1-1/2" above finished grade as specified on plans and details.

2.03 FENCING AND GATES:

- A. All system components must be galvanized steel. Sizes must be as specified in the following table for perimeter fencing and backstop and wing fencing.
- B. For Galvanized Site Fencing & Gates:

Type	4' Ht.	6' - 8' Ht.	10' Ht.	>10'Ht.	20' or Higher
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Terminal / Corner Posts	2-3/8" O.D.	2-7/8" O.D.	2-7/8" O.D.	4" O.D.	4" O.D. or larger
Line Posts	1-7/8" O.D.	2-3/8" O.D.	2-3/8" O.D.	2-7/8" O.D.	2-7/8" O.D.
Top Rails	1-5/8" O.D.				
Intermediate Rails	N/A3	1-5/8" O.D.1	1-5/8" O.D.	1-5/8" O.D.	1-5/8" O.D.
Bottom Rails	N/A3	N/A3	1-5/8" O.D.	1-5/8" O.D.	1-5/8" O.D.
Post Footing Size for Gate, Terminal, or Corner Posts	12" W 30" D	12" W 36" D	18" W 36" D	18" W 48" D	24" W 60" D
Post Footing Size for Line Posts	12" W 24" D	12" W 36" D	18" W 36" D	18" W 48" D	24" W 48" D
Fabric, Mesh Size	2"	2"	2"	2"	2"
Fabric, Finished2 Size	9-gauge	9-gauge	9-gauge	9-gauge	9-gauge

- 1 All 6' and 8' height fencing must have an intermediate rail.
- 2 All chain link fabric must be galvanized before weaving.
- 3 Bottom rails are not required for 6' and 8' height fencing unless otherwise specified on the plans.

2.04 GATES AND GATE POSTS:

- A. General: Gateposts, frames, and hardware must be hot-dipped galvanized, as noted, for framework. All fittings must be galvanized as specified in Section 2.01. Gate frames must be hot-dipped galvanized after welding or painted with zinc-enriched paint in accordance with Section 05 50 00. Gate fabric must match fencing fabric. Gates must maintain a gap no greater than two (2) inches between gateposts and frames or ground.
- B. Gates:
 1. Gate Posts: Must be 2-7/8 inches (73 mm) O.D. (min.) schedule 40 steel pipes (or larger, depending upon the size of the gate opening).
 2. Gate Frames: Must be 1-7/8 inches (48 mm) O.D. steel pipe with joints notched and welded to form a rigid frame. Welds must be provided with a galvanic coating meeting the requirements of Section 05 50 00. Frames must be filled with same fabric as fence and fastened in the frame by means of tension bars and tension bands at 1 foot (30.48 cm) on center
 3. Diagonal Bracing: Must be 3/8-inch O.D. adjustable truss rod to ensure frame rigidity without sag or twist.
 4. Hinges: Must be pressed steel to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Provide 2 hinges for each leaf. Drill, tap, and set screw or weld to frame and post to prevent rotation. Hinges must be Bulldog Industrial hinge, or approved equal.

5. Single Gate Latch: Provide heavy-duty gate fork latch of correct size malleable iron to permit operation from either side of gate, with padlock eye as integral part of latch.

2.05 FITTINGS:

- A. Fittings must be hot-dipped galvanized pressed steel in accordance with ASTM F 626-89a. All fittings must be industrial quality.

2.06 ACCESSORIES:

- A. Post tops must be pressed steel and designed as a weather tight closure cap for tubular posts.
- B. Tension bars must be of one piece lengths equal to full height of fabric with a minimum cross section of 3/16" x 3/4". Provide a tension bar for each gate, end post, corner and pull posts
- C. Tension bar bands (vinyl or powder coated), must be pressed steel per ASTM F 626-89a spaced not over 12 inches (304.8 mm) on center to secure tension bars to end, corner, pull, and gate posts.
- D. Tension Wire: Contractor must provide a No. 7 W & M gauge galvanized high carbon coiled tension wire (when bottom rail is not specified) stretched along the bottom of fabric and fastened to the fabric at intervals of not more than two feet (2') using steel hog rings. Tension wire must be attached with brace band, and nut and bolt. Tension wire must be terminated around the bolt to itself with a minimum of three complete wraps.
- E. Wire Ties: 9-gauge aluminum wire ties, spaced at 12 inches (304.8 mm) on center (typ.). Tie fabric to tension wire with 9 gauge hog rings at 18 inches (457.2 mm) on center (typ.).
- F. Touch-up Paint: Paint all exposed holes and welds, with a base coat of zinc enriched paint followed by two coats of silver (aluminum) matte finish paint, typical. Zinc enriched paint must meet the requirements and be applied in accordance with Section 09 91 00 paragraphs 2.02 and 3.07.E as applicable. Silver top coat paint must be silver (aluminum) matte finish. Silver top coat paint must be "COROTHANE 1, Mio-Aluminum"; Aluminum Hammerite; or approved equal.

2.07 PRIVACY SLATS AND PRIVACY FABRIC SCREENING

- A. Tubular Polyethylene Slats: Minimum 0.023-inch thick tubular polyethylene, manufactured for chain-link fences from virgin polyethylene with UV inhibitor, sized to fit mesh specified for direction indicated.
 1. Color: Standard color to be selected by Engineer.
- B. Privacy Fabric: Heavy-duty commercial grade HDPE or polypropylene privacy mesh at interior side of all site fencing.
 1. Basis of Design: FenceScreen, 350 Series.
 2. Color: To be selected from standard color options.

2.08 FINISHES

- A. All fence and gate components shall be hot dip galvanized and shall be finished with a black vinyl coating applied over the galvanization, with a minimum coating weight of 1.8 oz/sq ft

PART 3 - EXECUTION

3.01 SITE PREPARATION:

- A. The Contractor is responsible for all temporary barricades, enclosures, and protection of adjacent property and existing work. These are to be in place before operations are started. Coordinate this work with other work and trades. Complete clearing and site preparation work is required prior to excavation.

3.02 FENCE CONSTRUCTION:

- A. Posts:
 - 1. Provided welded steel baseplate for surface mounted installation, refer to the drawings and Section 05 50 00 – Metal Fabrications.
 - 2. Posts must be spaced 10 feet (304.8 cm) on center maximum.
- B. Rails:
 - 1. Top rail must be securely fastened to terminal posts and pass through tops of line post fittings, forming a continuous rail for the full length of fence. Top rail must be furnished in lengths approximately 21 feet (640.08 cm) long with standard hot dip galvanized steel expansion couplings not less than 6" in length. Lengths less than 10 feet (304.8 cm) shall not be used adjacent to terminal posts.
 - 2. Intermediate and bottom (when specified) rails must conform to the same specification as top rail and be joined at line posts with double-end socket clamps or brace bands and rail ends, with one inverted to maintain smooth line.
- C. Brace Assemblies: All corner, terminal, and gate posts must be furnished with complete brace assembly, including brace of same material and finish as top rail, and adjustable tightener for 3/8 inch (9.52 mm) truss rod. Corner and terminal posts must have two brace assemblies, one in each direction. The diagonal 3/8 inch adjustable truss rod must be attached to the first ensuing line post. Install braces so that posts are plumb and true when diagonal rod is under proper tension. No truss rod is required if the intermediate rail is continuous.
- D. Fabric: Pull fabric taut and tie to posts and rails. Install fabric on interior or playing side of fences and anchor to framework so that the fabric remains in tension after pulling force is released. Lower edge of fabric must be set level with finished grades (1-1/2" above grade typ.) except as specified on plans and details.
- E. Wire Ties: Tie fabric to line posts, rails, and braces with 9-gauge aluminum wire ties, spaced at 12 inches (304.8 mm) on center (typ.). Tie fabric to tension wire with 7-gauge hog rings spaced at 18 inches (457.2 mm) on center (typical). Attach all wire ties per accepted industry standards and as follows:
 - 1. Attach hooked end of tie to fabric above and close to the top or side of the rail or post.
 - 2. Wrap the end of tie under so that the wire tie locks into place and will not come loose under normal use.
 - 3. Wrap the wire tie around the rail snugly and affix to fabric below and close to the rail
 - 4. Twist the end of the wire tie at least one full revolution around the fabric so that the tie will not come loose under normal use.

- F. Tension Bars: Fabric must be attached to the terminal posts by means of single piece tension bars. Thread through fabric and secure to posts with metal bands spaced not over 12 inches (304.8 mm) on center (typ.).
- G. Welding: All field welds must be fully filled, ground flush and smooth, and provided with galvanic coding meeting the requirements of Section 05 50 00.

3.03 GATES:

- A. Install gates as shown on the Details and Drawings. Openings between frame or gate members must not exceed two (2) inches. Gaps between bottom rail and finish grade must not exceed one and one half (1-1/2) inches.
- B. Install gates plumb, level, and secure for full opening without interference. Adjust hardware for smooth operation and lubricate where necessary. After the Engineer's approval of operation, drill, tap, and setscrew or spot-weld all hinges and latch hardware to prevent rotation.
- C. Set gatepost same as terminal posts.

END OF SECTION