

**PORT OF TACOMA
TACOMA, WASHINGTON
ADMINISTRATION BUILDING RESTROOM REPAIRS**

**PROJECT NO. 101339.02
CONTRACT NO. 071547**



**Thais Howard, PE
Director, Engineering**


**David Myers, NCARB, CSI
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> |
|---|---|
|  | 02 07 00 Selective Demolition 08 10 00 Hollow Metal Frames 08 21 00 Wood Doors 08 71 00 Door Hardware 08 71 13 Power Door Operator 09 22 16 Non-Structural Metal Framing 09 26 00 Gypsum Board Assemblies 09 30 00 Ceramic Tile 09 65 00 Resilient Base 09 91 00 Painting 10 14 00 Signage 10 21 14 Toilet Compartments 10 26 00 Wall Protection 10 28 00 Toilet Room Accessories 10 51 00 Lockers |
|  | 20 02 00 Operation and Maintenance Manual for Mechanical 20 05 00 Common Work Results for Mechanical 20 05 03 Existing Systems Work for Mechanical 20 05 19 Piping Specialties for Mechanical 20 05 29 Hangers and Supports for Mechanical 20 05 30 Sleeves and Seals for Mechanical 20 05 90 Underground Utilities Excavation and Fill for Mechanical 20 05 93 Testing, Adjusting, Balancing for Mechanical 20 07 00 Mechanical Insulation 20 08 00 Commissioning of Mechanical Systems 21 10 00 Water-Based Fire Suppressions Systems 22 11 00 Facility Water Distribution 22 13 00 Facility Sanitary Sewerage 22 40 00 Plumbing Fixtures 23 31 00 HVAC Ducts and Casings 23 33 00 Duct Accessories 23 37 00 Air Outlets and Inlets |

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|  | <table><tr><td>26 01 00</td><td>Electrical General Requirements</td></tr><tr><td>26 04 00</td><td>Existing Electrical Systems</td></tr><tr><td>26 05 00</td><td>Basic Materials and Methods</td></tr><tr><td>26 09 20</td><td>Lighting Controls</td></tr><tr><td>26 50 00</td><td>Lighting Fixtures</td></tr></table> | 26 01 00 | Electrical General Requirements | 26 04 00 | Existing Electrical Systems | 26 05 00 | Basic Materials and Methods | 26 09 20 | Lighting Controls | 26 50 00 | Lighting Fixtures |
| 26 01 00 | Electrical General Requirements | | | | | | | | | | |
| 26 04 00 | Existing Electrical Systems | | | | | | | | | | |
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| 26 09 20 | Lighting Controls | | | | | | | | | | |
| 26 50 00 | Lighting Fixtures | | | | | | | | | | |

END OF SECTION

PROCUREMENT AND CONTRACTING REQUIREMENTS

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- 20 05 30 – Sleeves and Seals for Mechanical
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- 26 05 00 - Basic Materials and Methods
- 26 09 20 - Lighting Controls
- 26 50 00 - Lighting Fixtures

END OF SECTION

PART 1 - GENERAL**1.01 SUMMARY**

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

| Sheet No. | Drawing Title |
|-----------|---|
| G1.0 | Cover |
| AD1.1 | Demolition Floor Plans |
| AD1.2 | Demolition Ceiling Plans |
| AD1.3 | Existing Photos |
| A1.1 | Floor Plans |
| A1.2 | Ceiling Plans |
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| A4.0 | Details |
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| M0.3 | Mechanical Schedules |
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| M1.2 | Level 1 - Demolition Plan - Plumbing |
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| M4.3 | HVAC Details |
| M4.4 | HVAC Details |
| M5.1 | Fire Protection Plans |
| E0.1 | Legend, Schedule & Detail |
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| E1.2 | Level 2 - Electrical Demo |
| E2.1 | Level 1 - Lighting Plan |
| E2.2 | Level 2 - Lighting Plan |
| E3.1 | Level 1 - Power Plan |
| E3.2 | Level 2 - Power Plan |

PART 2 - PRODUCTS - NOT USED**PART 3 - EXECUTION - NOT USED****END OF SECTION**

ADMINISTRATION BUILDING RESTROOM REPAIRS

PROJECT NO. 101339.02 | CONTRACT NO. 071547

| | |
|---|--|
| Scope of Work: | <p>The Work required for this Project includes:</p> <p>The demolition of two restrooms located on the first floor and two on the second floor directly above those on the first floor. Reconstruction of new restrooms in a rotated orientation to accommodate ADA and code compliance. These restrooms are located inside of an existing office building that will be occupied during the work. Provisions for noise and dust control will need to be employed. As the work is within a secured area TWIC credentials or appropriate escort will be required.</p> |
| Bid Estimate: | <p>Estimated cost range is \$445,000 to \$488,000, plus Washington State Sales Tax (WSST).</p> |
| Sealed Bid Date/ Time/Location: | <p>Bids will be received at the Front Reception Desk, Port Administration Office, One Sitcum Plaza, Tacoma, Washington 98421 until 2:00 P.M. on 09/08/2021, at which time they will be publicly opened and read aloud, and the apparent low bid will be determined.</p> |
| Pre-Bid Conference and Site Tour: | <p>A pre-Bid conference and site visit have been set for August 25, 2021 at 10:00 A.M. The site visit will convene at the Port's Administrative building located at One Sitcum Plaza. Attendees will be required to sign a Release and Acceptance of Responsibility and Acknowledgement of Risks Form prior to entering the site. All visitors to the building must meet current COVID protocols including wearing a mask and maintaining 6' distance between others.</p> |
| Bid Security: | <p>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.</p> |
| Contact Information: | <p>Any questions to the Port may be emailed to procurement@portoftacoma.com. No oral responses will be binding by the Port.</p> <p>Questions will not be accepted after seven (7) days prior to the Bid Date.</p> |
| Bidding Documents: | <p>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 071547. 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.</p> |

Contact procurement@portoftacoma.com with questions. Holder's Lists will be updated regularly. 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.

END OF SECTION

PART 1 - SUMMARY

1.01 DEFINITIONS

1. 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. 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

1. 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 email request to procurement@portoftacoma.com at least seven (7) days prior to the Bid Date.
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. No Conditions. The Bidder shall make no conditions or stipulations on the Bid Form, nor qualify its Bid in any manner.

7. **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
8. **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

1. Communications from a Bidder related to these Instructions to Bidders must be in writing to procurement@portoftacoma.com. 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.

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 fifteen (15) 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 fifteen (15) 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 electronically to procurement@portoftacoma.com at least seven (7) days prior to the Bid Date. Substitution requests received after this time will not be reviewed.
 - 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.
- 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

- a. **PROJECT TITLE: Administration Building Restroom Repairs PROJECT NO.:**
- a. SUBMITTED BY: _____ CONTRACT NO.: 071547
- a. PRIME/SUB/SUPPLIER: _____ DATE: _____
- a. _____
- a. Specification Title: _____ Section No.: _____
- a. Description: _____ Paragraph: _____
- a. _____ Page No.: _____
- a. _____
- a. Proposed Substitution: _____
- a. Trade Name: _____ Model No.: _____
- a. Manufacturer: _____
- a. Address: _____ Phone No.: _____
- a. Installer: _____
- a. Address: _____ Phone No.: _____
- a. Differences between proposed substitution and specified product: _____
- a. _____
- a. _____
- a. ☐ Point-by-Point comparative data attached - REQUIRED
- a. _____
- a. Reason for not providing specified item: _____
- a. _____
- a. Similar Installation:
- a. Project: _____ A/E: _____
- a. Address: _____
- a. Owner: _____ Date Installed: _____
- a. Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____
- a. _____
- a. Supporting Data Attached:
- a. ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ Other: _____
- a. _____
- a. _____
- a. Applicable to Substitution Requests During Construction:
- a. Proposed to Port for accepting substitution: \$ _____
- a. Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ # days.
- a. _____
- a. The Undersigned certifies:
- i. • Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

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

a. -----

a. Submitted By: _____

a. Signed By: _____ Firm: _____

a. Address: _____

a. _____

a. Telephone: _____ Email: _____

a. Attachments: _____

a. _____

a. -----

a. A/E's REVIEW AND RECOMMENDATION

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

a.

a. Signed by: _____ Date: _____

a. -----

a. ENGINEER'S REVIEW AND ACTION

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

a.

a. Signed by: _____ Date: _____

END OF SECTION

PART 1 - GENERAL

1.01 EXISTING CONDITIONS

- A. Certain information relating to existing structures is available to Bidders online at www.portoftacoma.com, but will not be part of the Contract Documents, as follows:
 - 1. Building set: Entitled 1981 Admin Office Bldg drawing set.
 - a. This set includes the architectural, mechanical, plumbing and electrical drawings associated with the original building construction.
 - 2. Building set: Entitled 2002 Admin Office Bldg Renovation drawing set.
 - a. This set includes the architectural, mechanical, plumbing and electrical drawings associated with a remodel of the building.

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 Port is reasonably certain that asbestos and lead will not be disturbed by the project. If the Contractor encounters material suspected of containing lead or asbestos which will interfere with the execution of the work, the Contractor shall stop work and notify the Engineer.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

BIDDER'S NAME: _____**PROJECT TITLE: ADMINISTRATION BUILDING RESTROOM REPAIRS**

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 | PRICE |
|----------|-------------------------------------|-----|-----|-------|
| 1 | Mobilization and Demobilization | 1 | LS | |
| 2 | Project Administration | 1 | LS | |
| 3 | Project Demolition and Construction | 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.

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.

| Work to be Performed | Name of Firm |
|---|--------------|
| HVAC (Heating, Ventilation and Air Conditioning) Work | |
| Plumbing Work as described in RCW 18.106 | |
| Electrical Work as described in RCW 19.28 | |

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.

2.01 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.

2.02 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

2.03 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.

1.

| 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.

2.04 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.

_____ %

2.05 ADDITIONAL CONTRACTOR INFORMATION

- A. As part of completing this Responsibility Detail Form, **submit the following information with the completed Responsibility Detail Form:**
- 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.
 - 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: Administration Building Restroom Repairs

PROJECT NO.: 101339.02

CONTRACT NO.: 071547

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: Administration Building Restroom Repairs

BIDDER: _____

CONTRACT AND PROJECT NUMBER: 071547/ 101339.02

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 | |

| Item No. | Item | Initials/ Comments |
|-------------|--|-----------------------|
| | <p>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.</p> <p>Document if subcontractor confirms in writing, under penalty of perjury, that it has no employees and this requirement does not apply.</p> | |

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: Administration Building Restroom Repairs (Title)

101339.02 | 071547 (Project/Contract No.)

1 Sitcum Plaza (Project Address)

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

Director of Engineering (Title)

thoward@portoftacoma.com (Email)

(253) 592-6706 (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 December 31, 2021, subject to adjustments of this Contract Time as provided in the Contract Documents. The Contractor shall achieve Final Completion of the entire Work within 45 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 \$ 1000 per calendar day. After the required Final Completion date, the liquidated damages for failure to achieve Final Completion shall be \$500 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.

5.0 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)

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

AGENT OR BROKER (FOR INFORMATION ONLY)

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 Administration Building Restroom Repairs, Project No. 101339.02/Contract No. 071547, 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)

PORT OF TACOMA

P.O. BOX 1837

TACOMA, WA 98401-1837**AGENT OR BROKER (FOR INFORMATION ONLY)**

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 Administration Building Restroom Repairs, Project No. 101339.02/Contract No. 071547, 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: Administration Building Restroom Repairs

PROJECT NO.: 101339.02

CONTRACT NO.: 071547

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. 071547 with the Port for Administration Building Restroom Repairs, Project No. 101339.02.

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.

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.
 - i. 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.

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.
1. 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.
 - a. 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.
 - a. 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.
- i. 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.

- 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 no 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 \$25,000,000, 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.

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 \$25,000,000, 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 09/08/2021.
- 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:
 - a. <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.
 - a. Mailing Address: Washington State Department of Labor and Industries
 - i. Prevailing Wage Office
 - i. P.O. Box 44540
 - i. Olympia, WA 98504
 - a. Telephone: (360) 902-5335
 - a. 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 on each individual at all times while on the Project site and easily displayed when requested.

1.02 TRANSPORTATION WORKER IDENTIFICATION CARD (TWIC) SUMMARY

- A. TWIC is required for all personnel needing unescorted access to secure and restricted areas of Port facilities subject to 33 CFR 105, including truckers, surveyors, construction personnel, and delivery personnel. Secure areas are those areas with security measures for access control in accordance with a Coast Guard approved security plan. Restricted areas are those areas within a secure area that require increased limited access and a higher degree of security protection. New terminals under construction prior to terminal operations may not be designated secure areas. Construction on existing maritime transportation facilities and punchlist or other type of work requirements on facilities that have been certified under 33 CFR will require a TWIC.
- B. Contractors should allow for application and enrollment for the security threat assessment and issuance of TWIC when submitting a bid.

1.03 ESCORTING

- A. To access restricted Port facilities, all un-credentialed individuals must be accompanied by a person who has been issued a TWIC and trained as an escort at that specific facility. Each restricted facility has their own guidelines for escorting. Having escort training at one facility does not qualify you to escort at other facilities. Prior to conducting escort services for non-TWIC personnel, the escorts are required to contact the Facility Security Officer at the gate for verification they are on the escort list and to document who is being escorted. For required documentation, upon completion of escorting, the escort is to inform the Security officer that the escort is complete. It is the Contractor's responsibility to schedule escort training with the Facility Security Officer.
- B. For more information, refer to the Port Security website at:
<http://www.portoftacoma.com/shipping/security>
- C. For Project specific information, refer to Section 01 14 00 - Work Restrictions.

1.04 ELIGIBILITY FOR TWIC

- A. Refer to the Transportation Worker Identification Credential website at: <https://www.tsa.gov/for-industry/twic> for information on eligibility and applying for TWIC.

1.05 TWIC USE AND DISPLAY

- A. Each worker granted unescorted access to secure areas of a facility or vessel must present their cards to authorized personnel, who will compare the holder to his or her photo, inspect security features on the TWIC, and evaluate the card for signs of tampering. The Coast Guard will verify TWIC's when conducting vessel and facility inspections and during spot checks using hand-held scanners, ensuring credentials are valid.

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 Administration Building Restroom Repairs consists of:
 - a. The demolition of the existing men's and women's restrooms on both the first and second floors of the Port Administration building including architectural elements, walls as shown, flooring, plumbing fixtures including waste and supply lines and HVAC and Electrical items as shown.
 - b. Construction of new men's and women's restrooms on both the first and second floors of the Port Administration building including architectural elements, new walls and entry components, flooring, plumbing fixtures including waste and supply lines and HVAC and Electrical items as shown.

1.02 LOCATION

- A. The work is located at: 1 Sitcum Plaza

1.03 WORK PERFORMED UNDER SEPARATE CONTRACTS

- A. The Contractor shall, by way of the Engineer, familiarize itself with other contracts which have been awarded, about to be awarded or are in progress in the same or immediate area. The Contractor shall coordinate the progress of its work with the established schedules for completion and phasing.
 - 1. Administration Building Roof Replacement
 - a. Complete removal and replacement of the roof components including soffits, gutter, and related components.

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 in an existing building which will be partially occupied during normal business hours, as stipulated below.
 - 2. Protect materials and equipment in areas adjoining the immediate work area.
 - 3. All access will be through the entry defined by the Engineer.
 - 4. Contractor shall make every effort to minimize noise and conversations during normal business hours that could be excessively disruptive.
 - 5. Dust control measures such as plastic walls or other means shall be employed to prevent construction dust from traveling throughout the building. Protection or closing off of the HVAC system shall also be accomplished to prevent construction dust or debris from entering these systems.
- C. Working Facility
 - 1. The Facility 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.
 - 2. TWIC Escorting Requirements:
 - a. The Port Administration Building is a secured facility. All Contractor personnel shall have valid TWIC credentials with them at all times when in the building or adjacent secured areas. (Parking lot behind the building)
 - b. If personnel do not have TWIC credentials, the Contractor, at no additional cost to the Port, shall provide appropriate escort staff in accordance with Federal Guidelines.
- 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 Port 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. Mechanical Work Constraints:

- a. Plumbing systems outside of the restrooms must remain in full operation at all times during the work.
- b. HVAC systems outside of the restrooms must remain in full operation at all times during the work.

2. Electrical Work Constraints:

- a. Electrical systems outside of the restrooms must remain in full operation at all times during the work.

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 e-Builder®.

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 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.

1.06 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: Project Demolition and Construction

1. Item Description: The Work of this item includes all labor and materials to complete the demolition and new construction as defined in the Contract Drawings and Specifications.
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.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXEUTION - 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 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 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 Engineer.
- B. Provide updated Schedule of Values as required by the 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.
- 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

C. Cost Meeting

- 1. A separate cost meeting may be set up by the Engineer to discuss RFI's (or any other issues) that may cause scope, schedule or monetary changes to the contracts in more detail than necessary at the progress meeting. The Engineer will arrange, host and provide an agenda for cost meetings. Attendees would include the Engineer, Contractor's job superintendent and others as invited.

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®) for electronic information exchange throughout the duration of the Contract, as later described.
 - 1. e-Builder® 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®.
 - 3. The joint use of this system is to facilitate and coordinate the electronic exchange of Requests for Information, Submittals, Change Order Proposals, Pay Applications, and project specific correspondence.

1.02 USER ACCESS LIMITATIONS

- A. Contractor's access to e-Builder® is granted and controlled by the Engineer.
 - 1. The users assigned by the Contractor to use e-Builder® 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® 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® 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® as described above.
 - 2. Information, basic user guides and requirements on methods for using e-Builder®.

3. Instruction for the Contractor's staff utilizing e-Builder®.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 UTILIZATION OF E-BUILDER®

- 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®.
- C. The Port will not be liable for any delays associated from the usage of e-Builder® 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® 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 e-Builder® (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 e-Builder® 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 e-Builder® 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)

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 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. Engineering controls/equipment to be used to protect against anticipated hazards;
 - 6. Personal protective equipment and clothing including head, foot, skin, eye, and respiratory protection;
 - 7. Procedures which will be used for:
 - a. Lockout/Tagout,
 - b. Suspicious materials and/or unidentified materials,
 - 8. Site housekeeping procedures and personal hygiene practices;
 - 9. Administrative controls;
 - 10. Emergency plan including locations of and route to nearest hospital;
 - 11. Recordkeeping including:
 - 12. Name and qualification of person preparing the HASP and person designated to implement and enforce the HASP;
 - 13. Lighting and sanitation; and
 - 14. 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.
- D. The Contractor shall include in the HASP recent requirements associated with the State's COVID-19 Job Site Requirements as noted at in the Appendix or online at <https://www.governor.wa.gov/sites/default/files/Phase%201%20Construction%20COVID-19%20Safety%20Requirements%20%28final%29.pdf>.

1.03 POTENTIAL PHYSICAL AND OTHER HAZARDS

- A. The Work of the Contractor is described elsewhere in these specifications. Precautions to prevent all anticipated physical and other hazards shall be addressed in the HASP.
- 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. Trips and falls.

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 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. Enclosure equipment (for dust control);
 - 4. Warning signs and labels;
 - 5. Fire extinguishers;
 - 6. Equipment to support lockout/tagout procedures;
 - 7. Personal protective equipment (hard hats, foot gear, skin and eye);
 - 8. Demolition equipment and supplies;
 - 9. First aid equipment;
 - 10. Spill response and spill prevention equipment; and
 - 11. 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. 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.
- C. 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.
- D. 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.
- E. 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.
- F. 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 and is trained to use all necessary safety equipment. The person must be available and/or present at all times while work is being performed.
- 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 PERMITS, CODES, AND REGULATIONS

- A. The following permits/approvals have been applied for (or are on file) and incorporated into the Contract:
 - 1. City of Tacoma Building Permit
- 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 telecommunications services,
 - 2. Temporary sanitary facilities,
 - 3. Temporary Controls: Barriers and enclosures

1.02 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services at time of project mobilization. It is the Contractor's responsibility to be able to receive phone calls and emails at the job site.

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.
- D. The Port is providing temporary sanitary facilities for Port staff and Visitors under a separate contract. These facilities will NOT be available for construction staff use.

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 the remainder of the building, and to protect existing facilities and adjacent areas from damage from construction operations and demolition.
- B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as necessary 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

1.06 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

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

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes requirements relating to the following:
 - 1. Access roads
 - 2. Parking
 - 3. Construction parking controls

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 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.

3.02 PARKING

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

3.03 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.

3.04 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.

3.05 REMOVAL, REPAIR

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

3.06 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. 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 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. Fit work neatly to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with approved material in accordance with code requirements, to full thickness of the penetrated element.

I. Patching:

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

3.05 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. Clean all interior surfaces, fixtures and other installed items per manufacturer's recommendations.
 - k. 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 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures
 - 2. Final completion procedures
 - 3. Warranties
 - 4. As-Built Drawings

1.02 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

1.03 PROJECT SUBMITTALS

- A. Submittal of Project Warranties
- B. Record Drawings
 - 1. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous recordkeeping requirements and submittals in connection with various construction activities.
- C. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.04 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request:
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Port unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in individual Sections, including specific warranties, operation and maintenance manuals, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 3. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by the Contract Document or Engineer. Label with manufacturer's name and model number where applicable.
 - 4. Submit test/adjust/balance records.
 - 5. Submit changeover information related to Port's occupancy, use, operation, and maintenance.

- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request:
 - 1. Make final changeover of permanent locks and deliver keys to Port
 - 2. Complete startup and testing of systems and equipment
 - 3. Perform preventive maintenance on equipment used prior to Substantial Completion
 - 4. Instruct Port's personnel in operation, adjustment, and maintenance of products, equipment, and systems
 - 5. Advise Port of changeover in heat and other utilities
 - 6. Terminate and remove temporary facilities from Project site
 - 7. Complete final cleaning requirements
- D. Submit a written request for inspection to determine Substantial Completion a minimum of 5 days prior to the date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Notice of Substantial Completion after inspection or will notify Contractor of items, either on the Contractor's list or additional items identified by the Engineer, that must be completed or corrected before notice will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for final completion.

1.05 PUNCH LIST (LIST OF INCOMPLETE ITEMS)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of Construction.
 - 1. Organize list of spaces in sequential order.
 - 2. Organize items applying to each space by major elements.

1.06 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete and submit the following:
 - 1. Submittal of all remaining items, including as-built documents, final completion construction photographic documentation, damage or settlement surveys, surveys, and similar final record information and all other submittals defined in the Contract Documents.
 - 2. List of Incomplete Items: Submit copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (Punch List). Copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of DD days prior to date the work will be complete and ready for final inspection and tests. On receipt of request, the Engineer will either proceed with inspection or notify contractor of unfulfilled requirements.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

C. Execution of all Change Orders.

1.07 FINAL ACCEPTANCE PROCEDURES

A. Submittals Prior to Final Acceptance:

1. Receipt and approval of application for final payment; due within seven (7) days of receipt of Final Completion by the Engineer;
2. Contractor's signed waiver and release of claims on the Engineer provided form;
3. Contractor's submittal of list of all suppliers and subcontractors and the total amounts paid to each on the Engineer provided form; and
4. Contractor's submittal of a list of all subcontractors and suppliers requiring Affidavits of Wages paid on the Contract and certify that each of companies will submit an approved Affidavit of Wages paid to the Port within 30 days.

B. The Engineer will issue the Final Acceptance Memo upon receipt of the required submittals.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S WARRANTY

- A. The Contractor warrants the labor, materials and equipment delivered under the contract to be free from defects in design, material, or workmanship, and against damage caused prior to final inspection. Unless otherwise specified, this warranty extends for a period of one (1) year from the date of Substantial Completion.
1. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit the Port's rights under warranty.
 2. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Port or Port tenants during construction.
 3. Submit Warranties to the Engineer as a submittal, as described in 01 33 00 – Submittal Procedures.
 4. Provide additional copies of each warranty in Operation and Maintenance Manuals as described in 01 78 23 – Operation and Maintenance Manuals.
- B. In the event of equipment failure, during such time or in such a location that immediate repairs are mandatory, the Contractor shall respond promptly (within 48 hours), irrespective of day of the week. If the Contractor is not available, the Port will affect repairs. The Contractor shall then reimburse the Port for parts and labor necessary to correct deficiencies as defined within the warranty clause and time.

2.02 AS-BUILT DRAWINGS

- A. Project As-Built Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
- B. 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.
 - 1. The Project As-Built Drawings will be submitted on paper full-sized (ANSI D) copy.
 - 2. 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
 - 3. Project As-Built Drawings must be complete and accepted by the Engineer before Final Completion is issued.
 - 4. As-Built Drawings shall be in accordance with horizontal and vertical control as shown on the drawings.

PART 3 – EXECUTION

3.01 MAINTENANCE OF AS-BUILT DRAWINGS

- A. The Contractor shall maintain at the Project site, in good order for ready reference by the Engineer, one complete copy of the Contract Documents, including Addenda, Change Orders, other documents issued by the Port, a current Progress Schedule, and approved Submittals. The Contractor shall also generate and keep on site all documents and reports required by applicable permits.
- B. The Contractor's As-Built Drawings shall be updated to record all changes made during construction. The location of all existing or new underground piping, valves and utilities, and obstructions located during the Work shall be appropriately marked until the Contractor incorporates the actual field dimensions and coordinates into the as-built drawings. The as-built drawings shall be updated at least weekly and before elements of the Work are covered or hidden from view. After the completion of the Work, the as-built drawings shall be provided to the Port.

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. Operation and Maintenance Manual Submittal

1.02 SUBMITTALS

- A. Operation and Maintenance Data:

1. For equipment, or component parts of equipment put into service during construction and operated by the Port, submit completed documents within ten days after acceptance.
2. Submit a complete copy of completed documents 10 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
3. Submit 3 sets of revised final documents in final form by Final Completion.

PART 2 - PRODUCTS

2.01 OPERATION AND MAINTENANCE MANUALS

- A. For small equipment and products (such as furnishings or equipment not requiring routine maintenance), the following information (minimum of 3 printed copies, plus one electronic copy on CD) shall be furnished for all items on the Project requiring operational and/or maintenance procedures and for any additional items indicated by the Engineer. Printed information shall be organized by the Contractor into appropriately sized 3-ring binders (no larger than 3"). 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. Electronic information shall be in PDF format (additional formats where specified) and shall be organized with folders and appropriate file names so as to make the information easily accessible:

1. Product Summary:
 - a. Provide the following information (as applicable, indicate 'N/A' where an item does not apply) in Excel spreadsheet format:
 - 1) Description
 - 2) Plan Sheet Number
 - 3) Vendor
 - 4) Manufacturer
 - 5) Model Year
 - 6) Serial Number
 - 7) Warranty – Start Date; Finish Date
 - 8) Purchase Price
 - 9) Make
 - 10) Model

2. Operating Procedures: These instructions consist of the manufacturer's recommended step-by-step procedures for use of the product.
3. Maintenance Procedures: These instructions consist of the equipment manufacturer's recommended steps and schedules for maintaining the product.
4. 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.
5. Complete identification, including model and serial numbers.
6. Submittal information, as specified in Section 01 33 00 Submittal Procedures.
7. 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.
8. Provide DVDs, and audio-visual training materials utilized in the manufacturer's instruction program for the Port.
9. All operation and maintenance information shall be comprehensive and detailed and shall contain information adequately covering all normal operation and maintenance procedures.
10. 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.
11. 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.
12. 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 final acceptance.

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Selective site demolition.
- B. Related Sections:
 - 1. Refer to division 01 for general information related to project controls and temporary controls.
 - 2. Refer to Plumbing, HVAC and Electrical Divisions

1.02 SUBMITTALS

- A. Submit under provisions of Section 01 33 00
- B. Shop Drawings: Demolition and removal sequences of operations, locations of barriers and enclosures, and temporary work and construction facilities.

1.03 PROJECT RECORD DOCUMENTS

- A. Submit in accordance with Section 01 77 00.

1.04 QUALITY ASSURANCE

- A. Comply with demolition procedures and Waste Management Plan submitted to and accepted by owner and Architect.; refer to section 01 74 19

1.05 REGULATORY REQUIREMENTS

- A. Conform to Regulatory Requirements.
- B. Obtain required permits form Regulatory Authorities before proceeding. Obtain permits before closing or obstructing roadways, sidewalks, hydrants, and fire lanes.

1.06 SALVAGE/RELOCATION OF BUILDING ITEMS

- A. General: Salvaged items are those items that are to be removed and reinstalled as part of the Work.
 - 1. None.

1.07 SURPLUS OF BUILDING ITEMS

- A. General: Surplused items are those items that are to be removed and turned over to the Owner.
 - 1. There are no items to be surplused.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Comply with Section 01 50 00 for temporary controls and contractor use of premises.
- B. Limit use of air hammers and core drilling and other noisy equipment as much as possible. Limit use of such equipment between the hours of 8:00 PM and 7:00 AM Monday through Friday; on weekends from 5:00 PM Saturday until 7:00 AM Monday.
- C. Limit dust to lowest practicable level.

1.09 COORDINATION

- A. Existing Conditions: Contractor to familiarize himself/herself with the requirements of the work and to visit the site to determine the full extent of demolition required. Contractor shall employ all reasonable means of site verification and review of reference documents of the existing facility to make this determination.
- B. Owner disruptions: Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities, which will severely impact Owner's normal operations.
- C. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
- D. Schedule activities with demolition and removal sequence of operations approved by Architect and/or engineer.
- E. Install barriers to prevent non-authorized areas into demolition zones.
- F. Protect paved areas, landscaping, and site furnishes from demolition work (Including hauling).
- G. Provide traffic control during peak campus activities or in campus area with high volume of public traffic (pedestrian and/or vehicular).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that site demolition may safely and appropriately begin.
- B. Verify acquisition of required permits and permission from local governing authorities.

3.02 SELECTIVE SITE DEMOLITION

- A. Remove existing materials, utilities and equipment as shown on Drawings in preparation for new construction under Work of this contract.
- B. Remove abandoned items and extraneous material such as abandoned pipe and conduit.

3.03 UTILITIES DEMOLITION

- A. Arrange for and verify termination of utility services encountered. Do not shut off or cap utility services without 72 hours prior notice to Owner.
- B. Cap and tag lines remaining in place with identifying labels. Show locations on Project Record Documents, per Section 01 77 00.

3.04 PROTECTION

- A. Furnish and install drop cloths to protect furnishings left within the work area. Maintain dust barriers between work and occupied areas.

3.05 DISPOSAL

- A. Do not store, burn or bury materials on site.
- B. Remove demolished material and debris from site and dispose or recycle in a legal manner. Maintain hauling routes clean and free from demolition work.

3.06 ADJUSTING

- A. Repair, replace or reimburse Owner, deducted from Contract Sum, damage to existing building systems, landscape, and paving designed to remain, as directed by the Architect.

3.07 SCHEDULE OF DEMOLISHED MATERIALS

- A. General: Contractor to verify quantity of materials to be removed.
- B. The following list of items to be demolished is included as a convenience to the contractor.
 - 1. Ceramic tile flooring and wall finishes
 - 2. Ceramic tile mudset
 - 3. VCT flooring
 - 4. Partition walls
 - 5. Partition wall finishes (down to the studding)
 - 6. Acoustical and GWB ceilings
 - 7. Toilet partitions
 - 8. Wood doors and hollow metal frames
 - 9. Refer to mechanical and electrical for additional demolition (toilet fixtures, lighting, diffusers, outlets and the like)

END OF SECTION 02 07 00

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. Joint Sealants
- B. Related Sections include the following
 - 1. Division 9: finishes

1.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide paintable, latex 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.

1.04 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.

1.05 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00 Submittals.
- 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.

1.06 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.

1.07 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°F
 - 2. When joint substrates are wet due to rain, frost, condensation, or other causes
- B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealer manufacturer for application indicated.
- 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.

1.08 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealers to occur not less than 21 or more than 30 days after completion of waterproofing unless otherwise indicated.

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
- B. Manufacturer's warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
- C. Warranty period: 10 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 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: For each product of this description indicated in the Acoustical Joint Sealant Schedule at the end of Part 3, provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834.

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.

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 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.
- D. 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.
- E. 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 of 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. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants
- D. 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.
- E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- F. 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.

- G. 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 INTERIOR JOINT SEALANT SCHEDULE

- A. Latex (water-based, including EVA, acrylic)
 - 1. Products:
 - a. Tremco: "Tremflex 834" siliconized, latex sealant)
 - b. Substitutions under provisions of 00 26 00

END OF SECTION 07 92 00

PART 1 - GENERAL

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.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Steel or hollow metal frames.
- B. Related Sections include the following:
 - 1. Section 07 92 00 Joint Sealants
 - 2. Section 08 21 00 Wood Doors
 - 3. Section 08 71 00 Door Hardware for door hardware
 - 4. Section 09 90 00 Painting for field painting of primed doors and frames.

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.

1.04 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.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of SDI-100-85.
- 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.

1.06 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. Indicate frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, and finish.
- D. Submit manufacturer's installation instructions under provisions of Section 01 60 00.
- E. Operations and Maintenance information under the provisions of Section 01 78 23.

1.07 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 Company
 - 3. Steelcraft
 - 4. Substitutions: Under provisions of Section 00 26 00.

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 A 653/A 653M, 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 A 153/A 153M, Class C or D as applicable.

2.03 FRAMES

- 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. For exterior use, form frames from 0.067-inch thick, metallic-coated steel sheets.
 2. For interior use, form frames from cold- or hot-rolled steel sheet of the following thicknesses:
 - a. Openings up to and including 48 Inches Wide: 0.0598-inch
 - b. Openings More Than 48 Inches Wide: 0.0747-inch.
 3. Frame Metal Thickness: 14 gauge (exterior); 16 gauge (interior)
 4. All hollow metal jambs to be filled with grout. Fill material to be coordinated with construction sequencing.
 5. 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.
 - e. For all frames, in addition to prime coat, apply one coat of asphalt emulsion undiluted, to all concealed surfaces of frames; no exceptions.
 6. Field Finish: Interior under provisions of Section 09 90 00
 7. 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.
 8. Anchors: Use manufacturer's standard jamb anchors or as indicated on drawings. (Use minimum 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 wide by 6 inches 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.

DIVISION 08 – Openings
SECTION 08 10 00 – Hollow Metal Frames

1. Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.
- D. Head Reinforcement: Where installed in masonry, leave vertical mullions in frames open at top for grouting.
- E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- F. 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 in height.
 - b. Four anchors per jamb from 69 to 90 inches 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 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.
- G. 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 bottom of frames at finish floor surface.
- H. Head Anchors: Provide 2 head anchors from frames more than 42-inches wide and mounted in steel-stud walls.
- I. 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.
- J. Structural Reinforcing Members: Provide as part of frame assembly, where indicated at mullions, transoms, or other locations to be built into frame.
- K. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
- L. 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.

- M. Plaster Guards: Provide 0.016-inch thick plaster guards or dust-cover boxes of same material as frame, welded to frame at back of hardware cutouts to close off interior of openings and prevent mortar or other materials from obstructing hardware operation.

2.04 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 wide by 6 inches 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.

2.05 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.

2.06 FABRICATION

- A. Fabricate 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. Hardware Preparation: Prepare 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 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."

2.07 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. Finish products specified in this Section after fabrication.

2.08 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.
- 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.
 - 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.

2.09 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 consistence to provide a uniform dry film thickness of not less than 0.7 mils.
 - 1. Shop 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 of size and profile indicated.
 - 1. 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.

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

END OF SECTION 08 10 00

PART 1 - GENERAL

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.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Shop-finished wood doors.
 - 2. Solid-core doors with wood-veneer faces.
 - 3. Factory staining flush wood doors.
 - 4. Factory fitting flush wood doors to frames and factory machining for hardware.

1.03 RELATED WORK

- A. For HM Frames, see Section 08 10 00, Hollow Metal Frames.
- B. For Hardware, see Section 08 71 00, Finish Hardware.

1.04 REFERENCES

- A. NWWDA I.S.1-80 - Industry Standard For Wood Flush Doors (Includes Standards I.S.1.1 through I.I.S.1.7). (National Wood Window and Door Association.)
- B. AWI - Quality Standards of Architectural Woodwork Institute.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
 - 1. Product Data: For each type of door. Include details of core and edge construction, trim for openings, and louvers.
 - a. Include factory-finishing specifications.
 - 2. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - a. Indicate dimensions and location of mortises and holes for hardware.
 - b. Indicate dimensions and locations of cutouts.
 - c. Indicate doors to be factory finished and finish requirements.
 - d. Indicate fire ratings for fire doors.
- B. Indicate door elevations, stile and rail reinforcement, internal blocking for hardware attachment, and cutouts for glazing.

- C. Submit manufacturer's certificate that doors meet or exceed specified fire rated requirements.
- D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
 - 1. Faces of factory-finished doors with transparent finish to match Architect's sample for stained finishes.
- E. Submit sample of shop-finished veneer for Architect's approval.

1.06 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Reference Standards: Comply with the following:
 - 1. Conform to requirements of NWWDA industry standards 1.S 1A series.
 - 2. Conform to AWI's "Architectural Woodwork Quality Standards" for SLC-5, for grade of door, core, construction, finish, and other requirements.
 - 3. Conform to WIC Section 20-Doors.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Test Pressure: Test atmospheric pressure.
 - 2. Temperature-Rise Rating: At stairwell enclosures, provide doors that have a temperature-rise rating of 450°F) maximum in 30 minutes of fire exposure.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.
- C. Delivery:
 - 1. Package each door individually in plastic bags or cardboard cartons, sealed on both faces and all edges for complete protection.
 - 2. Deliver to dry building. Building in condition of average prevailing relative humidity.
 - 3. Deliver in Manufacturer's original unopened protective material or container.
 - a. Clearly mark covering with Manufacturer's name, brand name, size, thickness, and identifying symbol.
- D. Storage:
 - 1. Stack flat on 2x4 lumber, laid 12" from ends and across center.

2. Under bottom door and over top of stack provide plywood or corrugated cardboard to protect door surfaces.
 3. Store doors in area where there will be no great variation of heat, dryness, and humidity.
- E. Handling: Do not drag doors across one another.
- F. Package, deliver, and store doors in accordance with ANSI/AWMA requirements.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

1.09 WARRANTY

- A. Provide life of installation warranty under provisions of Section 01 00 10.
- B. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- C. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than ¼ inch (6.35 mm) in a 42-x-84 inch (1067 x 2134 mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75 mm) span, or do not comply with tolerances in referenced quality standard.
1. Warranty shall be in effect during the following period of time after the date of Substantial Completion:
 - a. Solid-Core Interior Doors: Life of installation.
- D. Warranty: Delamination of facing, warping, or defective materials signed by Contractor and Supplier.
- E. Guarantee materials and workmanship under conditions of NWWDA standard door guarantee.
- F. Warranty to include compensation to the Owner for refinish and reinstallation of defective doors, where defect was not apparent prior to installation

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Flush Wood Door Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Algoma Hardwoods Inc.
 - 2. Eagle Plywood & Door Manufacturing, Inc.
 - 3. Eggers Industries
 - 4. Vancouver Door Company, Inc.
 - 5. VT Industries Inc.
 - 6. Weyerhaeuser Company
 - 7. Substitutions: Under provisions of Section 01 63 00.

2.02 DOOR CONSTRUCTION, GENERAL

- A. Doors for Transparent Finish: Comply with the following requirements:
 - 1. Grade: Premium with Grade A faces
 - 2. Faces: natural birch, rotary cut, to match existing doors.
 - 3. Pair and Set match: Provide for pairs of doors and for doors hung in adjacent sets.
 - 4. Stiles: Same species as face.

2.03 SOLID-CORE DOORS

- A. Particleboard-core doors: 5-ply solid lumber core with bonded edge bands. Comply with the following requirements
 - 1. Blocking: Provide wood blocking at particleboard-core doors as follows:
 - a. 5-inch (125 mm) top-rail blocking, at doors indicated to have closers.
 - b. 5-inch (125 mm) midrail blocking, at doors indicated to have exit devices.
 - c. 5-inch (125 mm) bottom-rail blocking, at exterior doors and doors indicated to have kick, mop, or armor plates.
- B. Interior Veneer-Faced Doors: Comply with the following requirements:
 - 1. Core: Particleboard core.
 - 2. Construction: Five plies with stiles and rails bonded to core; then entire unit abrasive planed before veneering.

2.04 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated.
 - 1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
 1. Light Openings: Trim openings with moldings of material and profile indicated.

2.05 FACTORY FINISHING

- A. General: Comply with referenced quality standard's requirements for factory finishing.
- B. Finish wood doors at the factory
- C. Stain Finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.
 1. Grade: Premium
 2. Stain: Finish to match to existing door into The Center for International Education
 3. Finish: Catalyzed epoxy – smooth satin finish
 4. Effect: Open-grained finish or semifilled finish.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine installed door frames before hanging doors.
 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 2. Reject doors with defects
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- B. Job-Fit (Factory-Fitted) Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide ¼ inch from bottom of door to top of threshold.
 - a. Comply with NFPA 80 for fire-rated doors.
 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

- 3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge, trim stiles and rails only to extent permitted by labeling agency.
- C. Shop-Finished (Factory-Finished) Doors: Restore finish before installation, if fitting or machining is required at Project site.

3.03 ADJUSTING AND PROTECTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation
- C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 21 00

PART 1 - GENERAL

1.01 SUMMARY

- A. Work under this section includes the complete finish hardware requirements for the project. Quantities listed are for the contractor's convenience only and are not guaranteed. Items not specifically mentioned, but necessary to complete the work shall be furnished, matching the items specified in quality and finish.
- B. Related Sections:
 - 1. Section 08110 Metal Doors and Frames
 - 2. Section 08 21 00 Wood doors and Frames

1.02 QUALITY ASSURANCE

- A. Product Qualification:
 - 1. To assure a uniform high quality of materials for the project, it is intended that only specified items be furnished. Comparable products may be accepted upon prior approval of architect.
 - 2. Hardware to be new, free of defects, blemishes and excessive play. Obtain each kind of hardware (Mechanical latch and locksets, exit devices, hinges and closers) from one manufacturer except where specified.
 - 3. Fire-Rated opening in compliance with NFPA80. Hardware UL10C/UBC-7-2 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved bearing hinges and smoke seal. Furnish openings complete.
- B. Supplier Qualifications
 - 1. Hardware supplier will be a direct factory contract supplier who employs a certified architectural hardware consultant (AHC) available at all reasonable times during the course of the work for project hardware consultation to owner, architect and contractor.
 - 2. Supplier will be responsible for detailing, scheduling and ordering of finish hardware.
 - 3. Conduct pre-installation conference at jobsite. Initiate and conduct with supplier, installer and related trades. Coordinate materials and techniques and sequence complex hardware items and systems installation.
 - 4. Key Conference shall be initiated and conducted with owner to determine system, keyway(s) and structure.
- C. Installer Qualifications:
 - 1. Installer to have not less than 3 years experience specializing in installation of work in this section. Company must maintain qualified personnel trained and experienced in installing hardware.

1.03 REFERENCES

- A. NFPA80 – Fire Doors and Windows
- B. NFPA101 – Life Safety Code
- C. NFPA105 – Smoke and Draft Control Door Assemblies
- D. ANSI A117.1 Specifications for making Buildings usable by physically handicapped people.

1.04 SUBMITTALS

- A. Hardware schedule: Submit 6 copies of schedule. Organize Vertically formatted schedule into Hardware Sets with index of doors and headings, indication complete designations of every item required for each door or opening. Include the following:
 - 1. Type, style, function, size, quantity and finish of hardware items.
 - 2. Name, part number and manufacture of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Explanation of abbreviations, symbols and codes contained in schedule.
 - 5. Door and frame sizes, materials and degrees of swing.
- B. Product Data: Submit 4 copies for each product indicated.
- C. Templates: Obtain and distribute templates for doors, frames, and other works specified to be prepared for installing door hardware.
- D. Wiring/Riser diagrams: as required for electric hardware indicated.
- E. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.
- F. Keying Schedule: Prepared by or under the supervision of supplier, after receipt of the approved finish hardware schedule, detailing Owner's final keying instructions for locks.
- G. Samples: Upon request submit material samples.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, handle and protect products to project site under provisions of Division 1 and as specified herein
- 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 keys to Owner by registered mail.

1.06 WARRANTY

- A. The finish hardware shall have a limited warranty against defects in workmanship and operation for a period of one year from date of substantial completions and the following items are as shown:
 - 1. Closers Thirty years mechanical, two years electrical.
 - 2. Locksets Seven years

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Provide all door hardware for complete work, in accordance with the drawings and as specified herein.
- B. Provide items and quantities not specifically mentioned to ensure a proper and complete operational installation.

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2.02 MANUFACTURERS:

- A. Any item shown in the hardware schedule, but not listed below shall be supplied as shown unless otherwise approved by the Architect.

| ITEM: | MANUFACTURER: | ACCEPTABLE SUB: |
|--------------------------|----------------------------------|-----------------|
| Hinges | (IVES) Ives | McKinney, Hager |
| Locks | (SCH) Schlage | None |
| Keying | (SCH) Schlage | None |
| Exit Devises | (VON) Von Duprin | Precision |
| Closers | (LCN) LCN | None |
| Automatic Operators | Refer to Section 08 71 13 | |
| Activation Switches(MSS) | MS Sedco | LCN |
| Silencers | (IVE) Ives | Hager, Trimco |
| Push & Pull Plates | (IVE) Ives | Hager, Trimco |
| Kickplates | (IVE) Ives | Hager, Trimco |
| Stops & Holders | (IVE) Ives | Hager, Trimco |
| Overhead Stops | (GLY) Glynn-Johnson | Rixon |
| Threshold | (NGP) National Guard | Pemko |
| Seals & Bottom | (NGP) National Guard | Pemko |

2.03 HANGING

- A. Conventional Hinges: Hinge open width minimum, but of sufficient throw to permit maximum door swing. Steel or stainless steel pins.
1. Three hinges per leaf to 7 feet, 6-inch height. Add one for each additional 30 inches in height or any fraction thereof.
 2. Provide 4 ½ x 4 ½ for 1 ¾" thick doors up to 36". Provide 5 x 4 ½ on doors over 36".
 3. Exterior outswing doors to have non removable (NRP) pins.
 4. Pin tips, flat button, finish to match leaves
 5. Interior doors over 36" – Heavy weight
 6. Interior doors up to 36" – Standard weight

2.04 LOCKSETS, LATCHSETS, DEADBOLTS

- A. Heavy Duty Mortise Locks and Latches: as scheduled.
1. ANSI A156.13 Series 1000, Grade 1 Strength, Security and Operational requirements.
 2. UL listed for A label and lesser class single doors up to 4ft x 8ft.
 3. Meets A117.1 Accessibility Codes.
 4. Latch bolts shall be steel with minimum 3/4" throw.
 5. Lock case steel.
 6. Locksets to be tested to exceed 3,000,000 cycles.
 7. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
 8. Lock Series and Design: Schlage L9000 series, "06A" design.

2.05 KEYS, KEYING, AND KEY CONTROL

- A. All cylinders and permanent cores to be keyed to the existing Port of Tacoma masterkey system.

2.06 CLOSERS

- A. Surface Closers: [4040]
1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
 2. ISO 2000 certified. Units stamped with date-of-manufacture code.
 3. Independent lab-tested 8,000,000 cycles.
 4. Thru-bolts at wood doors unless doors are provided with closer blocking. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
 5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
 6. Opening pressure: Exterior doors 8.5 lb., interior doors 5 lb., labeled fire doors 15 lb.
 7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
 8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
 9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
 10. Exterior doors do not require seasonal adjustments in temperatures from 120 degrees F to –30 degrees F, furnish data on request.
 11. Non-flaming fluid will not fuel door or floor covering fires.

2.07 OTHER HARDWARE

- A. Door stops: Provide stops to protect walls, casework or other hardware.
1. Except as otherwise indicated, provide stops (wall or overhead) at each leaf of every swinging door leaf.

2. Where wall stops are not appropriate, provide overhead holders.
- B. Weatherstrip and Gasket
 1. Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled.
 2. Provide non-corrosive fasteners as recommended by the manufacturer for application indicated.
- C. Thresholds
 1. Except as otherwise indicated, provide standard metal threshold unit of type, size and profile as detailed or scheduled.
- D. Silencers
 1. Interior hollow metal frames, 3 for single doors, 4 for pairs of doors.
- E. Kick Plates:
 1. Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

2.08 HARDWARE FINISH

- A. Provide the finishes to match to the existing door finish in the vicinity of the restrooms.

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS:

- A. Factory trained, certified, and carries a factory-issued card certifying that person as a "Certified Installer". Alternative: can demonstrate suitably equivalent competence and experience.

3.02 PREPARATION:

- A. Ensure that walls and frames are square and plumb before hardware installation.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes. Notify Architect of any code conflicts before ordering materials.

3.03 INSTALLATION

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
- B. Drill pilot holes for fasteners in wood doors and/or frames.

3.04 ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
- B. Hardware damaged by improper installation or adjustment methods to be repaired or replaced to Owner's satisfaction.

3.05 FOLLOW UP INSPECTION

- A. Installer to provide letter of agreement to Owner that approximately 6 months after substantial completion, installer will visit project with representative of the manufacturers of the locking devices and door closers to accomplish the following:
 1. Re-adjust locks and closers
 2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.

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3. Identify items that have deteriorated or failed.
4. Submit written report identifying problems and likely future problems.

3.06 DEMONSTRATION

- A. Demonstrate electrical, electronic and pneumatic hardware system including adjustment and maintenance procedures

3.07 PROTECTION/CLEANING

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.08 DOOR HARDWARE GROUPS

Group 1

Doors 145, 146, 233, 230

| | | | | | |
|---|----|----------------------|--|-------|-----|
| 1 | EA | CONT. HINGE | 705 EPT | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 CON | ✓ 689 | VON |
| 1 | EA | POWER TRANSFER CABLE | CON- ____ P (THRU-DOOR) | ✓ | SCE |
| 1 | EA | POWER TRANSFER CABLE | CON- ____ P (HINGE-TO-POWER SUPPLY) | ✓ | SCE |
| 1 | EA | CLASS SEC W/DB & AUX | L9483EU 06A L283-722 37-015 DM XL11-422 | ✓ 630 | SCE |
| 1 | EA | CYLINDER | 80-131 | 626 | SCH |
| 1 | EA | PERMANENT CORE | 80-037 | 626 | SCH |
| 1 | EA | ELECTRIC STRIKE | 6400 FSE 12/24 VAC/VDC | ✓ 630 | VON |
| 1 | EA | SURF. AUTO OPERATOR | Refer to Section 08 71 13 | | |
| 2 | EA | ACTUATOR, WALL MOUNT | 1078-H | ✓ 630 | MSS |
| 1 | EA | WALL STOP | WS407CCV | 630 | IVE |
| 3 | EA | SILENCERS | SR64 | | IVE |
| 1 | EA | POWER SUPPLY | PS902 SERIES | | VON |

SEQUENCE OF OPERATION:

1. RESTROOM UNLOCKED WHEN NOT OCCUPIED.
2. EXTERIOR ADO ACTIVATION SWITCH MOMENTARILY RELEASES ELECTRIC STRIKE, AND ACTIVATES AUTOMATIC DOOR OPERATOR TO OPEN DOOR.
3. OCCUPANT TURNS INTERIOR THUMBTURN WHICH PROJECTS DEADBOLT AND CHANGES INDICATOR FROM "VAC" TO "OCC".
4. DEADBOLT MONITOR SWITCH (DX) TURNS POWER "OFF" TO EXTERIOR ADO ACTIVATION SWITCH.
5. TO EXIT, OCCUPANT EITHER MANUALLY TURNS LEVER AND EXITS, OR PUSHES INTERIOR ADO ACTIVATION SWITCH WHICH RELEASES EM STRIKE AND ACTIVATES AUTOMATIC DOOR OPERATOR TO OPEN DOOR.

END OF SECTION 08 71 00

PART 1 - GENERAL

1.01 SUMMARY

- A. Work under this section includes overhead concealed type, low energy force automatic door operators/closers, complete with controls.

1. Openers are furnished and installed under this section

- B. Related Sections:

1. Section 08 40 00 Aluminum Entrances and Doors
2. Section 08 71 10 Door hardware
3. Division 26 — Electrical

- C. Electronic Hardware Coordination: Coordinate Work of this Section with the requirements of systems specified under Divisions 26 and 28, as required to provide materials, fabrication, and installation for complete and operating system meeting the operational requirements stated.

1.02 REFERENCES

- A. Standards

1. ADAAG - Americans with Disabilities Act "Accessibility Guidelines for Buildings and Facilities"
2. ICC/ANSI A117.1 - 1998 Accessible and Usable Facilities and Buildings
3. ANSI/BHMA A156.19 — Power Assist and Low Energy Operated Doors
4. Underwriters Laboratories - Building Materials Directory SUBMITTALS

1.03 SUBMITTALS

- A. General Requirements: Submittals shall be in accordance with Section 013300, Submittal Procedures.

- B. Product Data: Submit Six (6) copies of manufacturer's data for each item.

- C. Shop Drawings:

1. Submit shop drawings indicating complete product description of each product.
2. Indicate locations to receive Operators, Wall, and Jamb Switches.
3. Show elevations, field measurements, hardware mounting, and anchorage.
4. Included complete rough-in and wiring diagrams for each application.
5. Indicate anchors, joint system, and other components not included in manufacturer's standard data.

- D. Operations and Maintenance Data.

1. Submit Maintenance and Operations Manuals under the provisions of Section 01 00 10, Closeout Procedures.
2. Manuals shall contain final copy of the Shop Drawings, Product Data, Templates, Installation Instructions, Wiring Diagrams, and Warrantees.

1.04 QUALITY ASSURANCE

- A. Supplier: Operators shall be supplied by a recognized supplier who has been furnishing operators in the same area as the project for a period of not less than five (5) years. They shall be a factory direct authorized distributor.
- B. Installer: The Operators and Accessories shall be installed by factory authorized and trained personnel, certified in compliance with American Association of Automatic Door Manufacturer (AAADM) requirements.
- C. Templates: Furnish templates for each fabricator of doors, frames and other work to be factory prepared for the installation of the Operators. Upon request, check the shop drawings of such other work to confirm that provisions will be made for the proper installation of the Operators.
- D. Pre-installation Conference: Prior to commencement of electrical work, provide for local factory representatives of the Automatic Operators to attend a pre-installation conference to review rough in and installation requirements with representatives of the General Contractor, Electrical Contractor, Automatic Operator, and Aluminum Storefront Installers.
- E. Certificates: Prior to substantial completion, provide certification from the local manufacturers representative of the Automatic Operators that all Operator applications are installed in accordance with manufacturer recommendations. Submit certification in writing to the Owner in care of the Architect.
- F. Regulatory Requirements:
 - 1. Comply with applicable local and state building codes.
 - 2. Comply with the applicable requirements of ANSI Standard A156.19.
 - 3. Automatic Operators shall meet the requirements of éDAAG-1992, and IGC/ANSI A117.1 - 1998, Accessible and Usable Building and Facilities.
- G. LEED Credit Qualifications and Procedures: Provide materials compliant with the following requirements identified in Section 01 11 10.
 - 1. Recycled Content: Certify % of recycled content necessary to achieve LEED MR Credit Points 4.1 and 4.2.

1.05 PRODUCT HANDLING AND STORAGE

- A. Comply with requirements of Section 01 60 00.
- B. Protect finished surface to prevent damage during construction. Replace damage units.

1.06 WARRANTY

- A. Comply with Section Submittals shall be in accordance with Section 013300, Submittal Procedures.
- B. Operators and Actuators shall be guaranteed against defects in workmanship and operation for a period of one (1) year, backed by a factory guarantee of the manufacturer.

1.07 MAINTENANCE

- A. Installer shall provide continuing service and maintenance of all components for a period of one (1) year from date of substantial completion. Provide a written maintenance contract to the Owner with provisions requiring service within 24 hours after notification by the Owner of need for service, seven days a week.
- B. Furnish Provide One (1) Set of Special Tools required for installation and adjustment, which shall be delivered directly to the Owner prior to substantial completion.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Surface Concealed Automatic Operators:
 - 1. Specified Manufacturer: Horton 7000 Series Surface Mounted. Acceptable Substitutions: None
 - 2. Finish: Satin Nickel
- B. Wall Plate Actuators:
 - 1. Specified Manufacturer: MS Sedco
 - 2. Acceptable Manufacturers: Camden, Larco
 - 3. Stainless Steel with Blue Paint Filled Legend
- C. Key Switches:
 - 1. Schlage 653-0405-L2

2.02 OPERATION

- A. General: Provide operators of size recommended by the manufacturer for door size, weight, and movement, for condition of exposure, and for long term maintenance free operation under traffic load for occupancy indicated.
 - 1. Connections: Provide connections for power and control wiring.
 - 2. Function:
 - a. See Section 08 71 10 "Door Hardware"
 - b. Provide spring action for closing during manual operation.
 - 3. Adjustment Features:
 - a. Comply with ANSI/BHMA A156.19.
 - b. Operators shall be fully adjustable without removing doors.
 - c. Adjustable speeds, including opening, closing, and latching.
 - d. Adjustable time delay for length of time remains open.
 - e. Automatic door re-open if stopped while closing.
 - 4. On/Off Control: Provide on-board on, off, and hold open switch to control electric power to operator.
 - a. Locate on wall at 48" oc
- B. Locate Wall Plate and Jamb switches as indicated on drawings, or as directed by Architect.
- C. All wiring shall be concealed in the wall and door frames. Coordinate requirements with electrical contractor and storefront installer.

PART 3 - EXECUTION

3.01 GENERAL

- A. Automatic openers are installed and programmed by the manufacturer's representative.

3.02 PREPARATION

- A. Examine doors, frames, and related items for conditions that would prevent the proper application of the operators and activation switches. Do not proceed until defects are corrected.
- B. Provide solid blocking for all Wall Plate Actuators.
- C. Provide blocking between Automatic Operator back plate and door frame face where operator cannot be mounted directly to the frame face. Finish material to match door frame finish.
- D. Fasteners: Check all conditions and use fastening devices as needed to securely anchor all components as per manufacturer's published templates.

3.03 INSTALLATION

- A. Install each hardware item in compliance with manufacturer's instructions.
 - 1. Wherever cutting and fitting are required to install hardware surfaces which will be painted or finished at a later time, install each item completely and then remove and store in a secure place. After completion of the finishes, re-install each item.
 - 2. Do not install surface-mounted items until finishes have been completed on the substrate.
- B. Adjust and check each operating item of hardware and each door to insure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.

3.04 FINAL ADJUSTMENT

- A. Final Adjustment: Wherever hardware installation is made more than one (1) month prior to acceptance or occupancy, make a final check and adjustment of all hardware items during the week prior to acceptance or occupancy. Clean and lubricate operating items as necessary to restore proper function.
- B. Instruction: Instruct Owner's Personnel in proper adjustment and maintenance of Operators and Operator finishes

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Scope of work:
 - 1. Miscellaneous metal framing for ceiling and wall assemblies.
- B. Related Sections include the following
 - 1. For gypsum wall board refer to 09 26 00 Gypsum Wallboard
 - 2. For cement board products refer to Section 09 30 00 Ceramic Tile

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
- B. Shop drawings: Indicated details required for proper installation including gauges, typical cross sections, connection and fasteners to structure, fasteners, lateral bracing, and components not indicated by Product Data submittal.
- C. Product Data: Manufacturer's published literature including each type of metal stud framing system and accessory. Show compliance with Specifications.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in work of this section.
- B. Installer: company specializing in work of this section.
 - 1. Recommended by the Northwest Wall and Ceiling Bureau.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Listed manufactures are approved upon condition of satisfactory submittals referencing design requirements:
 - 1. Angeles Metal System (206) 852-3980
 - 2. CEMCO (818) 369-3564
 - 3. Knorr Steel Framing systems (503) 371-8033
 - 4. Steeler, Inc. (206) 725-2500
 - 5. Western Metal Lath and Framing systems 1-800-365-5284
 - 6. Clark Dietrich Building Systems
 - 7. Scafco Corporation

2.02 STEEL FRAMING

- A. Comply with ASTM C754 for conditions indicated

- B. Steel Sheet Components: Complying with ASTM C645 requirements for metal and with ASTM A653/A653M, G40 (Z120), hot-dip galvanized zinc coating.
- C. Non-Load Bearing-Light Gauge Framing Members: ASTM C 645, formed from steel meeting requirements of ASTM A 568, Grade 33, galvanized ASTM A 525, G 40, listed ICBO for structural design properties.
- D. Steel Studs and Runners:
 - 1. Minimum Base Metal Thickness: 22 gauge, or as indicated
 - 2. Depth: As indicated
- E. Deep-Leg Deflection Track: ASTM C645 top runner with 2-inch (50.8 mm) deep flanges.
- F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base Metal Thickness: 22 gauge
- G. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.03 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Components, General: Comply with ASTM c 754 for conditions indicated.
- B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0624-inch (1.59 mm) diameter wire, or double stand of 0.0475-inch (1.21 mm) diameter wire.
- C. Hanger Attachments to Concrete: As follows:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure a load equal to 5 times that imposed by construction as determined by testing according to ASTM 488 by a qualified independent testing agency.
 - 2. Typed: Post installed, expansion anchor.
- D. Hangers: As follows:
 - 1. Wire Hangers: ASTM A 641/A 641m, Class 1 zinc coating, soft temper, 0.162-inch (4.12 mm) diameter.
- E. Carrying Channels: cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538-inch (1.37 mm), a minimum ½-inch (12.7 mm) wide flange, with ASTM A653/A653M, G40 (Z120) hot-dip galvanized zinc coating.
 - 1. Depth: 2-1/2 inches (63.5mm).
- F. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 643/A653M, G40 (Z120) hot-dip galvanized zinc coating.
 - 1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8-inch (22.2 mm) deep.
 - a. Minimum Base Metal Thickness: 0.0209-inch (0.45 mm).
 - 2. Steel Studs: ASTM C 645.
 - a. Minimum Base Metal Thickness: 0.00209-inch (0.45 mm).
 - b. Depth: 3-5/8 inches (92.1 mm).

PART 3 - EXECUTION

3.01 INSPECTION

- A. Beginning of installation means acceptance of existing surfaces.

3.02 PREPARATION

- A. Protect installed finish work of other trades and surfaces to preclude damage from work of this Section.

3.03 INSTALLATION

- A. Erect work in accordance with Contract Documents, References, Codes, and Manufacturer's instructions. Where in conflict, follow more stringent requirements.
- B. Shimming and Bracing:
 - 1. Shim metal furring to provide true and level surface for application of wallboard.
 - 2. Cross brace chase partitions as recommended by manufacture or approved by Engineer.
 - 3. Laterally braced metal studs with finish system on side only or where finish system does not run full height of studs as, recommended by manufacturer, to meet lateral design loads.
- C. Supplementary Framing and Backing: Install continuous steel channel backing notched between studs. Coordinate with requirements for support of wall mounted items including shelving, plumbing fixtures, mechanical equipment, and other construction as required. Include supplementary framing where necessary to accommodate loading.

END OF SECTION 09 22 16

PART 1 - GENERAL

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.

1.02 SUMMARY

- A. This section includes the following:
 - 1. Interior gypsum board for partition walls.
 - 2. Taping and sanding.
- B. Related sections include the following:
 - 1. Section 07 92 00 – Joint Sealants.
 - 2. Section 09 22 16 – Non-Structural Metal Framing
 - 3. Section 09 30 00 – for ceramic tile backer boards
 - 4. Section 09 91 00 – Painting

1.03 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.04 REFERENCES

- A. ASTM C36 - Gypsum Wallboard and ASTM C-588 – Gypsum Veneer Base (“Blue Board”)
- B. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction
- C. ASTM C630 - Water Resistant Gypsum Backing Board
- D. ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board
- E. ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- F. ASTM C-840 Applications & Finishing of Gypsum Board
- G. ASTM E119 - Fire Tests of Building Construction and Materials
- H. GA-201 - Gypsum Board for Walls and Ceilings
- I. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board
- J. Gypsum Construction Handbook, third edition

1.05 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."
- B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency.
 - 1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 00 10.
- B. Include manufacturer's published descriptive literature for gypsum board types, trims, accessories, and control joints.
- C. Product information: Include manufacturer's published descriptive literature for gypsum board types, trims, accessories, and control joints.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Temperature and Ventilation: Provide adequate, properly regulated heating and ventilating in accordance with NWCB and manufacturer's instructions
- B. Lighting: Provide sufficient temporary lighting to properly perform the work and to achieve specified finishes.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - GYPSUM BOARD SYSTEMS

- A. US Gypsum
- B. National Gypsum Co
- C. Georgia Pacific
- D. BPB Products
- E. Substitutions: Under provisions of Section 01 63 00.

2.02 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Fire-Rated Gypsum Board: ANSI/ASTM C36; fire-resistive; UL rated; 5/8-inch thick, maximum permissible length; ends square cut, tapered edges. Type X.

2.03 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 - 1. Material: Aluminum-coated steel sheet, rolled zinc, or aluminum-coated steel sheet or rolled sheet.
 - 2. Shapes:
 - a. Corner bead: Use at outside corners.
 - b. LC-Bead (J-Bead): Use at exposed panel edges.
 - c. Expansion (Control) Joint: Use where indicated.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - 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. Aluminum: Alloy and temper with not less than the strength; and durability properties of ASTM B 221 (ASTM B221M), alloy 6063-T5.
 - 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.04 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C457.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, beveled panel edges, and damaged surface areas, use setting type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type sandable topping compound.
 - 5. Skim coat: For final coat of Level 4 finish, use setting-type sandable topping compound.

2.05 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

- B. Elastomeric Sealant: Medium-modulus, neutral-curing silicone sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturers for application indicated, and complying with requirements for elastomeric sealants specified in Division 7 Section "Joint Sealants."
- C. Reveal Molding: Extruded aluminum molding 5/8"x5/8" reveal equal to Fry Reglet # DRM-625-625.
- D. Reveal base: Extruded aluminum 5/8"x4" equal to Fry Reglet # DRMB-625-400.
- E. Corner Guards: Stainless steel corner guards at all outside corners to 4' A.F.F. Surface mounted guards to be 1 1/2" x 1 1/2", 16 ga. stainless steel, equal to Construction Specialties corner guard # SCO-8, mounted with construction adhesive standard. Field verify locations with Owner and Architect prior to installation.
- F. Wall Guards: 4" x 1" vinyl cover, rubber cushion material, aluminum retainer material.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Beginning of installation means acceptance of existing surfaces.

3.02 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with GA 201 and GA 216 and NWCB specifications and recommendations, and manufacturer's instructions. Where in conflict follow more stringent requirements.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Do not install GWB directly to the slip track at the top of partition walls.
- D. Corner Trim: Reinforce external corners with specified corner beads
- E. Edge Trim: Install square edged metal trim bead at exposed edges and boundaries of areas and where abutting dissimilar materials.
- F. Control Joints: Comply with NWCB GWB-5, except as otherwise indicated. Verify that required double framing is in place before installing control joints.
- G. Door and window openings: Minimum one control joint at each wall opening. Locate at strike side of door openings.

1. Continuous Wall Planes: Not to exceed 30 linear feet.
 2. Ceilings: Not to exceed 50 linear feet. Area not to exceed 2,500 square feet.
 3. Other trim: Install as indicated or required for complete and finished installation.
- H. Panel Joints:
1. Layout: Design to reduce joints to minimum.
 2. Install board in maximum lengths to minimize horizontal and vertical joints.
 3. Start installation of panels at exterior wall to position butt joints as far away from exterior wall as possible.
 4. Place edges in contact and fit neatly, without forcing into place.
 5. Stagger joints on opposite sides of partitions and on same side of wall surface at adjacent joints.
- I. Single Layer Systems: Install in accordance with ASTM C840. Where modified, amended, or otherwise, or required by fire resistive or sound isolation system, conform to the requirements of the manufacturer's tests, as approved.
1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) and horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- J. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- K. Mechanical and Electrical: Coordinate with Division 23 and 26. Provide for installations and penetrations of ductwork, equipment, receptacles, and other work.
- L. Cut boards at penetrations, edges, and other obstructions of the work; fit tightly against abutting construction, except provide a 3/8-inch setback where non-load-bearing construction abuts structural elements.

3.03 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.

3.04 JOINT TREATMENT

- A. Joints and Interior Angles; Tape embedded in joint compound and three separate coats of joint compound applied over joints, angles, fastener heads, and accessories. Tool joint compound smooth and free of tool marks and rides.
 - 1. Center reinforcing tape over joint and coat into compound leaving approximately 164 inch to 1/32 inch under tape to provide proper bond.
 - 2. Follow skin coat to embed tape, but not to function as second coat.
 - 3. Allow embedding coat to thoroughly dry prior to application of second coat.
 - 4. Allow embedding coat to thoroughly dry.
 - 5. Apply third coat evenly over and extending beyond second coat on joints, feathering to smooth uniform finish.
- B. Beads, Trim, Fastener and Joint Depressions:
 - 1. Cover with three coats of taping and joint compound, each applied in different directions to make true and level with adjacent surfaces.
 - 2. Allow sufficient drying time between coats.
 - 3. Leave depressions flush with surface plane.

3.05 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 - 1. Level 4: All new partitions.
- E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.06 LEVEL 4 FINISH

- A. Apply Level 4 Finish in accordance with NWCB for all finish areas.
- B. Where necessary sand between coats and after final coat, do not scuff paper, repair blemishes and joint ridges.
- C. After final sanding wipe all drywall surfaces with a damp sponge to remove dust and particles.
- D. Leave areas finished uniformly smooth for subsequent smooth finish (paint, wallcovering, or as indicated). No wall texturing is applied.

DIVISION 09 – Finishes

SECTION 09 26 00 – Gypsum Board Assemblies

- E. Apply a thin skim coat of joint compound, or material manufactured for this purpose, over entire surface. Finished surface to be free of tool marks and ridges.
- F. Beads, Trim, Fastener and Joint Depressions:
 - 1. Cover with three coats of taping and joint compound, each applied in different directions to make true and level with adjacent surfaces.
 - 2. Allow sufficient drying time between coats
 - 3. Leave depressions flush with surface plane.

3.07 ALLOWABLE TOLERANCES

- A. Shim panels as necessary to comply with tolerances.
- B. Between Board Faces: 1/16-inch offset.
- C. Plane, Level, Warp, and Bow: 1/8 inch in 8 feet.

3.08 CLEANING

- A. Clean beads, screeds, metal base, metal trim, mechanical and electrical items, and other work.
- B. Wipe clean, leaving work ready for finish specified under other Sections.
- C. As work is completed in each space, clean all rubbish, utensils, and surplus materials from the space. Leave floors broom-clean.

END OF SECTION 09 26 00

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Ceramic Wall Tile
 - 2. Porcelain Floor Tile
 - 3. Cementitious Backer Units
 - 4. Waterproof Membrane and Crack Suppression Membranes
 - 5. Metal Edge Trim

1.03 DEFINITIONS

- A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- B. Facial Dimension: Nominal Tile size as defined in ANSI A 137.1.

1.04 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028.
 - 1. Level Surfaces: Minimum 0.6.
 - 2. Step Treads: Minimum 0.6.
- B. Load-Bearing Performance: For ceramic tile installed on walkway surfaces, provide installations rated for the following load-bearing performance level based on testing assemblies according to ASTM C 627 that are representative of those indicated for this Project:
 - 1. Heavy: Passes cycles 1 through 12.

1.05 SUBMITTALS

- A. Product Data: For each type of tile, mortar, grout, and other products specified.
- B. Samples for Verification: Of each item listed below, prepared on Samples of size and construction indicated. Where products involve standard color and texture variations, include Sample sets showing the full range of variations expected.
 - 1. Each type and composition of tile and for each color and texture required, at least 12 inches (300 mm) square, mounted on braced cementitious backer units, and with grouted joints using product complying with specified requirements and approved for completed work in color or colors selected by Architect.
 - 2. Full-size units of each type of trim and accessory for each color required.
 - 3. Stone thresholds in 6-inch (150 mm) lengths.

- C. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- D. Qualification Data: For firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from one source and by a single manufacturer for each project:
 - 1. Stone thresholds.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section “Project Meetings.”

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A 137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.
- C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer’s written instructions.

1.09 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A 137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
 - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - 1. Match colors, textures, and patterns indicated by referencing manufacturer's standard designations for these characteristics.
 - 2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless another mounting method is indicated.
- F. Products: Subject to compliance with requirements, provide products indicated in the ceramic tile installation schedules at the end of this Section.

2.02 FLOOR & WALL TILE

- A. General: All new porcelain tile
- B. Rectilinear floor tile & first course of wall tile:
 - 1. Manufacturer: Daltile
 - 2. Style: Exhibition
 - 3. Size: 12x24
 - 4. Color: EX04 dark grey matte
 - 5. Grout color: Black

2.03 WALL TILE

- A. General: All new ceramic and/or porcelain tile
- B. Rectilinear wall tile:
 - 1. Manufacturer: Daltile
 - 2. Style: Exhibition
 - 3. Size: 6x24
 - 4. Finish: Matte
 - 5. Colors, 1/3 mixed:
 - a. EX01 white matte
 - b. EX02 grey matte
 - c. EX04 dark grey matte
 - 6. Grout color: Dark grey

2.04 SETTING MATERIALS

- A. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows:
 - 1. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
 - a. Ceramic Tile Floors: Custom Building Products "FlexBond – LFT Premium Crack Prevention Large Format Tile Mortar.
 - b. Ceramic Tile Walls: Custom Building Products "ProLite Premium Large Format Tile Mortar.

2.05 GROUTING MATERIALS

- A. Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy: ANSI A118.3.
 - 1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140°F and 212°F, respectively, and certified by manufacturer for intended use.
 - 2. Epoxy Grout: All tile locations
 - a. Custom "CEG-Lite, or approved equal meeting ANSI A118.3
 - b. Color: #165 Delorean Gray
 - c. For bidding purposes assume up to 4 grout colors

2.06 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements of Division 7 Section "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.
- D. Products: Subject to compliance with requirements, provide one of the following:

1. One-Part, Mildew-Resistant Silicone Sealants:
 - a. Dow Corning 786; Dow Corning Corporation.
 - b. Sanitary 1700; GE Silicones.

2.07 METAL EDGE STRIPS

- A. General: Provide tile trim units to comply with the following requirements:
 1. Basis of Design: Schluter Systems: “Jolly”
 - a. Material: anodized aluminum with brushed stainless steel appearance
 - b. Substitutions under 01 63 00
- B. Metal edge strips to be provided at locations as indicated on the drawings and:
 1. Transition between tile and gypsum wall board
 2. Transition from first course of wall tile (which is the same tile and grout color as the floor tile) to second course of wall tile.
 3. Transition between existing floor finishes and new tile to be bent stainless transition strip as shown in details.

2.08 CONCEALED ACCESS PANELS

- A. Basis of Design: Schluter Systems: “REMA”
 1. Material: anodized aluminum with brushed stainless steel appearance

2.09 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.10 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers’ written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

2.11 WATERPROOF AND CRACK SUPPRESSION MEMBRANE

- A. General: Manufacturer’s standard product that complies with ANSI A118.10, for use beneath all tile floors.
- B. Chlorinated-Polyethylene-Sheet Product: Nonplasticized, chlorinated polyethylene face on both sides with high-strength, nonwoven, polyester fabric, for adhering to latex-portland cement mortar: 60 inches wide by 0.030-inch nominal thickness.

- C. Available Manufacturers: Subject to compliance with requirements, provide one of the following products:
 - 1. Dalseal TS by Dal-Tile Corporation
 - 2. Nobleseal TS by The Noble Company
 - 3. LevelQuik Trowel and Seal Waterproofing and Anti-Fracture Membrane by Custom Building Products
 - 4. Chloraloy (CPE) by the Noble Company
 - 5. Kerdi by Schluter
 - 6. DITRA by Schluter

2.12 CEMENTITIOUS BACKER UNITS

- A. Provide cementitious backer units complying with ANSI A 118.9, of thickness and width indicated below, and in maximum lengths available to minimize end-to-end butt joints.
 - 1. Thickness: Manufacturer's standard thickness, but not less than ½ inch, unless otherwise indicated.
 - 2. Width: Manufacturer's standard width, but not less than 32 inches (813 mm).
- B. Products: Subject to compliance with requirements, provide one of the following products:
 - 1. Wonderboard Multi+Board; Custom Building Products.
 - 2. DomCrete Cementitious Tile-Backer Board; Domtar Gypsum.
 - 3. Util-A-Crete Concrete Backer Board; FinPan, Inc.
 - 4. DUROCK Cement Board; United States Gypsum Co.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A 108 series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

- B. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.
 - 1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
 - 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.03 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A 108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TC installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Grout tile to comply with the requirements of the following tile installation standards:
 - 1. For ceramic tile grouts (sand-portland cement, dry-set, commercial Portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
- G. Install cementitious backer units at all locations to receive wall tile and treat joints to comply with ANSI A108.11, UL U442 fire resistance rating at rated construction and manufacturer's written instructions for type of application indicated.

3.04 WALL TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

- B. Joint Widths: To match floor joints.

3.05 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove latex-portland cement grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure tile is without damage or deterioration at the time of Substantial Completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 - 2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from the tile surfaces.

3.06 CERAMIC TILE INSTALLATION SCHEDULE

- A. Wall Installation Method: TCA W244-E1 (thin-set mortar bonded to cementitious backer units on metal studs).

END OF SECTION 09 30 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General, Supplemental, and Special Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Section 09 26 00 Gypsum Board Assemblies

1.02 SUMMARY

- A. This Section includes the following
 - 1. Resilient wall base and accessories.

1.03 REFERENCES

- A. American Society for Testing & Materials (ASTM)
 - 1. ASTM D 2047: Standard Test Method for Static Coefficient of Friction of Floor Surfaces.
 - 2. ASTM D 5116: Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
 - 3. ASTM F 710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 4. ASTM F 1344: Standard Specification for Rubber Floor Tile (Sections 7.1-7.6, 8.4, 5& 6).
 - 5. ASTM F 1869: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride.
 - 6. ASTM E 648: Standard Test Method for Critical Radial Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 7. ASTM E 662: Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 8. ASTM E 1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 - 9. ASTM G 21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
 - 10. ASTM F 970-87 Test Method for Static Load Limit.
- B. National Fire Protection Association
 - 1. NFPA 101: Code for Safety to Life from Fire in Buildings and Structures.
 - 2. NFPA 253-1984 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
 - 3. NFPA 258-1989 Test Method for Specific Density of Smoke Generated by Solid Materials.

1.04 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.
 - 1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches (300 mm) long, of each resilient accessory color and pattern specified.

- C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- D. Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.
- E. Maintenance Data: For resilient floor tile to include in the maintenance manuals specified in Division 1.
- F. Submit Manufacturers Material Safety Data Sheet information and other instructions for the proper use of specified products to avoid adverse health and environmental effects.
- G. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 W/sq.cm. or greater when tested per ASTM E 648.
 - 2. Smoke Density: Maximum specified optical density of 450 or less when tested per ASTM E 662.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 65 and 85 deg F, and relative humidity between 25 percent minimum and 50 percent maximum, before and during installation.
- C. Store tiles on flat surfaces.
- D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturers.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting flooring application.

- B. Maintain a temperature of not less than 70°F or more than 95°F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post installation period, maintain a temperature of not less than 55°F or more than 95°F
- C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- D. Install tiles and accessories after other finishing operations, including painting, have been completed.
- E. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

1.08 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet (3 linear m) for each 500 linear feet (150 linear m) or fraction thereof, of each type, color pattern, and size of resilient accessory installed.

1.09 WARRANTY

- A. Provide manufacturer's standard warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products: basis of design; Tarkett Traditional Vinyl 1/8", 6" high.
- B. Substitutions under Provision 00 26 00

2.02 RESILIENT ACCESSORIES

- A. Wall Base: Products complying with FS SS-W-40, Type 1. Furnish with pre-molded outside corners of same material, height, thickness, and color(s) as base.
- B. Accessory Moldings: Products complying with requirements specified in the Resilient Tile Flooring Schedule.

2.03 INSTALLATION ACCESSORIES

- A. Adhesives: Non-toxic, Water-based, water-resistant type, free from volatile organic compounds (VOCs) and other hazardous ingredients, non-staining type as recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are to be placed a minimum thirty (30) days prior to the installation of resilient flooring. Slabs are to be dry and free from curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
 2. Subfloor finishes comply with requirements specified in Division 3 Sections "Cast-in-Place Concrete" and "Cement-based Underlayment" for slabs receiving resilient flooring.
 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits. Sealing of cracks, holes, and smoothing, and leveling of rough, uneven surfaces, must be carried out using a good quality Portland cement based leveling compound (feathering compound), approved by the manufacturer.
 4. Alkalinity test and moisture test must be performed. PH level should be in the range of 7 to 8.5. Moisture content must not exceed 3 lbs/1000 ft² per 24 hours, (verify using the calcium chloride test as per ASTM F 1869-98).
 5. Smooth, dense finish, highly compacted with a tolerance of 1/8" in a 10 ft. radius. Floor flatness and floor levelness (FF and FL) are not recognized.
 6. Installation will not be carried out unless above conditions are satisfied. Report any discrepancies to the General Contractor for correction.
- C. Prior to installation, inspect materials for defects, color variations, shipping damage, and other imperfections detrimental to appearance and performance. Verify that materials are from same dye lots. Replace defective materials at no additional cost to the Owner.
- D. Use stair-tread-nose filler, according to resilient tread manufacturer's written instructions, to fill nosing substrates that do not conform to tread contours.
- E. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

3.03 RESILIENT ACCESSORY INSTALLATION

- A. General: Install resilient accessories according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned. Fit joints tight and vertical.
 2. Install wall base at walls, cabinets, and all permanent fixtures.
 3. Uniformly spread enough adhesive to permit installation of materials. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 4. Do not stretch base during installation.
 5. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacture's recommended adhesive filler material.

6. Install pre-molded outside and inside corners before installing straight pieces. Mitered corners will not be accepted.

3.04 RESILIENT BASE SCHEDULE

- A. Rubber Wall Base RB-1: Where this designation is indicated, provide rubber wall base complying with the following:
 1. Manufacturer: Tarkett
 2. Color: to match existing
 3. Height: 6"
 4. Profile: Cove toe
 5. For bidding purposes assume at least two additional colors at "meet and match" locations

END OF SECTION 09 65 00

GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
 - 1. Exposed interior items and surfaces
 - 2. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Scope of work: Paint all exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color of finish, the Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed pipes and ducts, hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment in finished area of building.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels (unless specifically noted otherwise).
 - 1. Prefinished items include the following factory-finished components:
 - a. Architectural woodwork and casework.
 - b. Finished mechanical and electrical equipment.
 - c. Light fixtures.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Furred areas.
 - b. Ceiling plenums.
 - c. Pipe spaces.
 - d. Duct shafts.
 - 3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Bronze and brass.
 - 4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
 - 5. Labels: Do not paint over Underwriters laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Section 08 10 00 Hollow Metal Frames for shop priming steel doors and frames.
2. Section 09 26 00 Gypsum Board Assemblies for surface preparation for gypsum board.

1.03 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
3. Satin refers to a low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meters
4. Semi-gloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.04 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.

1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

B. Samples for Initial Selection (for colors not presently scheduled): Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. Samples for Verification (for colors scheduled): 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.

D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Product Content: Provide products that comply with requirements for VOC levels per Section 01 60 00.

1.06 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 stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45°F. 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 application.

1.07 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90°F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95°F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5°F above the dewpoint; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.08 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.
 - 1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.785 L) or 1 case, as appropriate, of each material and color applied.

1.09 WARRANTY

- A. Provide two-year warranty.

1.10 REFERENCES

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. USGBC LEED-NC - LEED Green Building Rating System for New Construction and Major Renovations; U.S. Green Building Council; 2009.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.
- B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
 - 1. Benjamin Moore & Co. (Moore).
 - 2. Columbia
 - 3. Sherwin-Williams Co. (S-W).
 - 4. Fuller-O'Brien Paints (Fuller).
 - 5. Kelly Moore
 - 6. Parker Paint Co.

2.02 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrate indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification 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 painting 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 painting 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 primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.02 PREPARATION

- A. General: Remove hardware and hardware accessories, plate, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. 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 paint 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.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
 1. Maintain containers used in mixing and applying paint 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 paint manufacturer and only within recommended limits.

E. Adhesion Test: Prior to finish coat.

1. Perform an adhesion test in advance of finish coat application in accordance with ASTM D3359 Standard Test Methods; Test Method A.

3.03 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term 'exposed surfaces' includes areas visible when permanent or built-in fixtures, convactor covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Sand lightly between each succeeding enamel or varnish coat
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. 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.
 2. Omit primer on metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint 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.

4. 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 painted.
 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 material that is required to be painted or finished and that has not been prime coated by others. 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 due to insufficient sealing.
- F. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- G. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from site.

3.05 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.06 INTERIOR PAINT PRODUCT SCHEDULE

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
 - 1. Low-Luster, Acrylic-Enamel Finish: 2 finish coats over a primer.
 - a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).
 - b. First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils (0.071 mm).
- B. Ferrous Metal (Interior only): Provide the following finish systems over ferrous metal:
 - 1. Low luster (semi-gloss) Finish: One finish coat over an enamel undercoat and a primer.
 - a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer as recommended by the manufacturer for this substrate, applied at spreading rate to achieve a total dry film thickness of not less than 1.5 mils (0.038 mm).
 - b. Undercoat: Alkyd, interior enamel undercoat or semigloss, acrylic-latex, interior enamel as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).
 - c. Finish Coat: Semi-gloss interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

3.07 INTERIOR PAINT SCHEDULE

- A. Items to be painted
 - 1. Gypsum wall board
 - 2. Hollow metal doors & frames
 - 3. Access doors
 - 4. Existing painted surfaces marred by construction work

3.08 COLOR SCHEDULE

- A. See finish schedule in drawings for paint colors.
- B. See drawings for color locations.
- C. Match existing paint finish and color at patch locations.

END OF SECTION 09 91 00

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

- A. Section includes plastic panel signs.

1.02 SUBMITTALS

- A. Product Data: Include manufacturer's construction details and catalog data relative to materials, dimensions of individual components, profiles, maintenance information and finishes for each type of sign and component required.
- B. Shop Drawings: Provide shop drawings for fabrication and erection of signs. As applicable, include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, and reinforcement, accessories, layout, and installation details, as applicable.
- C. Samples: Provide a sample panel not less than 4 inches by 5 inches for each material indicated. Include a panel for each color, texture, and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, colors and finishes of letters, numbers, and other graphic devices.

1.03 WARRANTY

- A. Provide one-year warranty from the date of the Physical Completion on materials and replacement of labor for all signage installed.

PART 2 - PRODUCTS

2.01 SIGNS, GENERAL

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines, WAC 51-50, SBC 2012 and ICC A117.1.

2.02 PANEL SIGNS

- 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. ACE Sign Systems, Inc.
 - 2. APCO Graphics, Inc.
 - 3. ASI Sign Systems, Inc.
 - 4. Best Sign Systems, Inc.
 - 5. InPro Corporation (IPC).

6. Mohawk Sign Systems.
 7. Vista System.
- B. Interior Panel Signs: PETG plaque featuring chemically fused layer of UV hardened, 1/32" thick raised Photopolymer characters and Braille chemically fused, not applied, to the PETG surface resulting in a single-piece construction, with square-cut edges and rounded corners.
1. Finishes and Colors: As selected from manufacturer's full range. Background color shall be blue with white lettering and symbols to comply with accessibility requirements.
 2. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
 3. Provide signs for rooms indicated on drawings mounted on the wall beside the room door.

2.03 MATERIALS

- A. Plastic Laminate: High-pressure laminate engraving stock with face and core in contrasting colors.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Locate signs where indicated or directed by Architect. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
- B. Wall-Mounted Signs:
1. Silicone-Adhesive Mounting: Use liquid silastic adhesive and high-bond tapes recommended by the sign fabricator to attach sign units to surfaces. Use double-sided VHB tape by 3M or approved.

END OF SECTION 10 14 00

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Toilet compartments and screens as follows:
 - 1. Type: High density polyethylene (HDPE).
 - 2. Compartment Style: Floor mounted with overhead brace (anti-grip profile).
 - 3. Screen Style: Wall hung

1.02 RELATED SECTIONS

- A. Section 09 26 00 Gypsum Board Assemblies
- B. Section 09 22 16 Non-Structural Metal Framing
- C. Section 10 28 00 Toilet Room Accessories for toilet paper holders, grab bars, shelves and similar accessories.

1.03 REFERENCES

- A. ANSI A117.1 - Specifications for making buildings and facilities accessible to and usable by physically handicapped people.
- B. FS RR-P-1352 - Partitions, Toilet, Complete.

1.04 SUBMITTALS

- A. Product data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.
- B. Shop Drawing: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6 – inch square samples of same thickness and material indicated for the Work.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Packaging: Individually wrap each panel.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

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1. Established dimensions: Where field measurements cannot be made without delaying the Work; establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

1.07 WARRANTY

- A. Warranty material and workmanship for three years from the date of Substantial Completion. Warranty to cover fading or chipping of finished surface as well as other defects. Warranty to cover labor cost to replace defective materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Scranton Products, Inc.
 2. Substitutions under provisions of 00 26 00.

2.02 MATERIALS

- A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stain, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.
- B. Door, Panel, and Pilaster Construction: Solid, high density polyethylene (HDPE) panel material, seamless with eased edges, and with homogeneous color and pattern throughout thickness of material
 1. Doors, panels, and screens: 1 inch
 2. Color and Pattern: Scranton Products "Grey" in orange peel texture.
- C. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design. ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inch (75 MM) high finished to match hardware.
- D. Full height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilaster of the following material:
 1. Material: Clear anodized aluminum.
- E. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:
 1. Material: Heavy duty stainless steel.
- F. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile in manufacture's finish.

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- G. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide hex-type bolts for through-bolt application. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.03 FABRICATION

- A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories and grab bars, as indicated.
- B. Compartment and Screens: Panels without splices or joints in facings or cores. Provide shiplap panel to door profile at all door jambs.
- C. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
- D. Wall-hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.
- E. Doors: Unless otherwise indicated, provide 24-inch (610 mm) wide doors with swings as shown in plans for standard toilet compartments and 36-inch (914 mm) wide doors with a minimum 32-inch (813 mm) wide clear opening for compartments indicated as handicapped accessible.
 - 1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open an any angle up to 90 degrees.
 - a. Continuous hinge at all doors*
 - 2. Latch and Keeper: Manufacturer's surface-mounted latch unit with occupancy indicator and combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
 - 3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
 - 4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
 - 5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

DIVISION 10 – Specialties
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- B. Verify correct spacing of plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing, where required.
- D. Beginning of installation means acceptance of existing surfaces.

3.02 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb and level. Provide clearances of not more than ½ inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacture's recommended anchoring devices.
 - 1. Secure panels to walls and panels with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so holds for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Attach with anchoring devices according to manufacturer's written instructions. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.03 ADJUSTING AND CLEANING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.
- B. Field touch-up of scratches or damaged finish will not be permitted; replace damaged or scratched materials with new materials.
- C. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10 21 13

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the following types of wall protection systems:
 - 1. FRP panels for custodial room

1.02 REFERENCES

- A. National codes (IBC, UBC, SBCCI, BOCA and Life Safety)
- B. American Society for Testing and Materials (ASTM)
- C. Underwriters Laboratories (UL)
- D. California 01350 specification

1.03 SUBMITTALS

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 00 "Submittal Procedures":
 - 1. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.
 - 2. Shop drawings showing locations, extent and installation details of wall covering products.
 - 3. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of color, texture, pattern and thickness:
 - 4. Sample of each product specified.
 - 5. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.
 - 6. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1.

1.04 QUALITY ASSURANCE

- A. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project.
- B. Manufacturer's qualifications: Not less than 5 years experience in the production of specified products and a record of successful in-service performance.
- C. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA, Life Safety and CA 01350.
- D. Fire performance characteristics: Provide engineered PETG wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class A/1 characteristics listed below:
 - 1. Flame spread: 25 or less
 - 2. Smoke developed: 450 or less

- E. Impact strength: Provide wall protection components that have been tested in accordance with the applicable provisions of ASTM F476.
- F. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
- G. Color match: Provide wall protection components that are color matched in accordance with the following:
 - 1. Delta Ecmc of no greater than 1.0 using CIELab color space. (Specifier note: Construction Specialties' colors are matched under cool white fluorescent lighting and computer controlled within manufacturing tolerances. Color may vary if alternate lighting sources are present.)
 - 2. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site in unopened original factory packaging clearly labeled to show manufacturer.
- B. Store materials in undamaged packaging in a clean, dry place out of direct sunlight and exposure to the elements. A minimum room temperature of 40°F and a maximum of 100°F should be maintained.
- C. Materials must be stored flat

1.06 PROJECT CONDITIONS

- A. Materials must be acclimated in an environment of 65-75°F for at least 24 hours prior to beginning the installation.
- B. Installation areas must be enclosed and weatherproofed before installation commences.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Interior surface protection products specified herein and included on the submittal drawings shall be manufactured by Construction Specialties, Inc., or approved equal.

2.02 MATERIALS

- A. Engineered PETG: Rigid sheet should be high-impact Acrovyn 4000 with standard Suede texture, nominal .040" (1.02mm) thickness. Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer. Colors to be indicated in the finish schedule from one of manufacturer's available colors and patterns.
- B. Aluminum: Optional aluminum trims to be alloy 6063 T5 with clear or colored anodized finish; minimum strength and durability properties as specified in ASTM B221. The colored anodized finish is available in eight colors and is not covered under 1.04.G.

2.03 WALL COVERING

- A. Engineered PETG rigid sheet to be CS Acrovyn: Nominal .040" (1.02mm) thick rigid sheet supplied in 4' x 8' or 10' (1.2m x 2.4m or 3.0m) sheet sizes in standard Suede texture. Specify color-matched caulk, clear caulk, Acrovyn trims or aluminum trims as needed for joints/transitions.
- B. Color: 265 Fog

2.04 FABRICATION

- A. General: Fabricate wall covering to comply with requirements indicated for design, dimensions, detail, finish and sizes.

2.05 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applications and designations of finishes.

2.06 ACCESSORIES

- A. Adhesive: Acrovyn wall covering shall be furnished as a complete packaged system, including appropriate standard adhesive.
- B. Primer, caulk and trims color matched to panel.

PART 3 – EXECUTION

3.01 Examination

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Preparation

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.03 Installation

- A. Install the work of this section in strict accordance with the manufacturer's recommendations using approved adhesive.
- B. Temperature at the time of installation must be between 65-75°F (18-24°C) and be maintained for at least 48 hours after the installation to allow for proper adhesive set-up.
- C. Relative humidity shall not exceed 80%.

- D. Do not expose wall covering to direct sunlight during or after installation. This will cause the surface temperature to rise, which in turn will cause bubbles and delamination.

3.04 Cleaning

- A. General: Immediately upon completion of installation, clean material in accordance with manufacturer's recommended cleaning method.
- B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.05 Protection

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION 10 26 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This section includes the following
 - 1. Toilet and bath accessories
 - 2. Under lavatory guards
 - 3. Toilet paper dispenser, paper towel dispenser, and soap dispenser are to be furnished by Owner and installed by Contractor.

1.03 SUBMITTALS

- A. Product data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify products using designation indicated on Drawings.
- C. Setting Drawings: For cutouts required in other work: include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.04 QUALITY ASSURANCE

- A. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
 - 1. Other manufacturer's products with equal characteristics may be considered. See Section 00 26 00 for Substitutions.
 - 2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.05 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disable persons, proper installation, adjustment, operation, cleaning, and servicing accessories.

- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:
 - 1. Toilet and Bath Accessories
 - a. Bobrick Washroom Equipment
 - b. Bradley Corporation
 - c. American Specialties, Inc.
 - d. A and J Washroom Accessories.
 - 2. Under lavatory Guards
 - a. Brocar Products, Inc.
 - b. Truebro, Inc
- B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Toilet and Bath Accessory Schedule at the end of Part 3.

2.02 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0323-inch (0.8 mm) minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; ASTM B 30, casting.
- C. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch (0.9 mm) minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180)
- E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base material.
- F. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic enamel coating.
- G. Galvanized Steel Mounting Devices: ASTM A 153 A 153/A 153M, hot-dip galvanized after fabrication.
- H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.03 FABRICATION

- A. General: One, maximum 1 ½ inch (38 mm) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless steel hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- B. Provide templates and rough-in measurements as required.
- C. Verify exact location of accessories for installation.

3.03 INSTALLATION

- A. Install accessories to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Install grab bars to withstand a downward load of at least 250 lbf (1112N), when tested according to method in ASTM F 446.

3.04 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.05 TOILET AND BATH ACCESSORY SCHEDULE

- A. Grab Bar "GB": Where this designation is indicated, provide stainless-steel grab bar complying with the following:
 - 1. Products: Bobrick B-6806
 - 2. Mounting: Concealed with manufacturer's standard flanges and anchors
 - 3. Gripping Surfaces: Manufacturer's standard "peened", slip resistant texture.
 - 4. Outside Diameter: 1-½ inches (38 mm) for heavy-duty applications.
 - 5. Lengths: 18" 36" and 42"
 - 6. Location: as indicated and detailed on the plans
- B. Sanitary Napkin Disposal
 - 1. Bradley 4781-11
 - 2. Surface-mounted type
- C. Under lavatory Guard:
 - 1. Products: Truebro Model No. 103
 - 2. Insulating Piping Coverings: White, antimicrobial, molded-vinyl covering for supply and drain piping assemblies intended for use at accessible lavatories to prevent direct contact with and burns from piping. Provide components as required for applications indicated with flip tops at valves that allow service access without removing coverings.
 - 3. Location: as indicated on the plans (minimum – at all exposed domestic hot water piping under lavatories).
- D. Waste Receptacle "WR": Where this designation is indicated, provide stainless-steel waste receptacle complying with the following:
 - 1. Freestanding:
 - a. Products: Bradley 377
 - b. Free-standing stainless steel waste receptacle.
 - c. Location: as shown on documents
 - 2. Paper towel dispenser:
 - a. Products: Bradley 2494
 - b. Finish: satin stainless steel
- E. Robe Hook : Where this designation is indicated, provide robe hook:
 - 1. Products: Bradley 9134 Towel Hook
 - 2. Location: as indicated on plans
 - 3. Mount at ADA height as required
 - 1. Warranty: one-year manufacturer's warranty
- F. Mirrors
 - 1. Products: Bradley 7815

DIVISION 10 – Specialties
SECTION 10 28 00 – Toilet Room Accessories

2. Size: refer to drawings for size

G. Toilet Seat Cover Dispensers

1. Products: Bradley 583
2. Finish: Stainless steel

H. Toilet Paper Dispensers

1. Products: Bobrick 2982
2. Finish: Stainless steel

I. Shower Curtain

1. Products: Bradley 9537
2. Size: 72x72
3. Location: one for each shower stall, and two for each changing room threshold.

J. Shower Curtain Hooks

1. Products: Bradley 9536
2. Location: one set of hooks for each shower stall

K. Shower Rod

1. Products: Bradley 953
2. Location: one for each shower stall, and one for each changing room threshold.

L. Shower Seat

1. Products: Bradley 9562
2. Location: one for each shower stall

M. Soap Dispensers

1. Bradley 6315
2. Finish: chrome

END OF SECTION 10 28 00

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Metal lockers.

1.02 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

1.03 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
- C. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lockers:
 - 1. Art Metal Products: www.artmetalproducts.com.
 - 2. Penco Products, Inc.: www.pencoproducts.com.
 - 3. Republic Storage Systems Co.: www.republicstorage.com.
 - 4. Substitutions: See Section 00 26 00.

2.02 LOCKER APPLICATIONS

- A. Wardrobe Lockers: Two tier metal lockers, wall mounted for base indicated on drawings. ADA accessible.
 - 1. Width: 18 inches
 - 2. Depth: 18 inches
 - 3. Height: 36 inches
 - 4. Fittings: 2 coat hooks.
 - 5. Locking: Gravity latch with padlock hasp, for padlock provided by Owner.

2.03 METAL LOCKERS

- A. Lockers: Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.

1. Color: To be selected by Architect; allow for different colors in each room.
- B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
 1. Body and Shelves: 16 gauge
- C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
 1. Door Frame: 16 gage, 0.0598 inch (1.52 mm), minimum.
- D. Doors: Hollow double pan, sandwich construction, 1-3/16 inch (30 mm) thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
 1. Door Outer Face: 14 gauge.
 2. Door Inner Face: 14 gauge.
 3. Form recess for operating handle and locking device.
 4. Provide louvers in door face, top and bottom, for ventilation.
- E. Hinges: Two for doors under 42 inches (1 050 mm) high; three for doors over 42 inches (1 050 mm) high; weld securely to locker body and door.
 1. Hinge Thickness: 14 gauge, 0.0747 inch (1.90 mm).
- F. Coat Hooks: Stainless steel or zinc-plated steel.
- G. Number Plates: Provide oval shaped metal plates. Form numbers of block font style with ADA designation, in contrasting color.
- H. Hood: Provide sloped hood at all lockers, 18 gauge minimum.
- I. Locking devices
 1. Lock hasp for Owner provided padlocks.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on prepared base.
- D. Install accessories.
- E. Replace components that do not operate smoothly.

3.02 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION 10 51 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Operation and Maintenance Manual.

1.03 SUBMITTALS

- A. General: Comply with Section 20 05 00 and Division 01.
- B. Preliminary O&M: Submit preliminary review O&M manual for review.
- C. Final O&M: Submit Final O&M manuals per Division 01.

PART 2 - PRODUCTS

2.01 GENERAL

- A. General Contents: A maintenance manual shall be compiled containing maintenance and operating information and maintenance schedules for all project mechanical systems. See Division 01 for quantities, organization, format, and other requirements; meet additional requirements as specified herein.
- B. CD Electronic Copy: Shall contain pdf open format copies of the entire O&M manual, pdf open format copies of record drawings, and ACAD files for record drawings where ACAD shop drawings or ACAD record drawings are required (see individual specifications Sections for requirements). Files shall be bookmarked by section and by product. Drawings shall be bookmarked and labeled by sheet number and name.

2.02 SUBMITTAL DATA AND TECHNICAL O&M DATA

- A. Submittal Data:
 - 1. General: Provide a copy the submittal data (clearly identified and marked to suit each item). Note: The submittals are not retained by the Owner and a copy is therefore required in the O&M.
 - 2. Product Data: Manufacturer's technical product data, with manufacturer's model number, description of the equipment, equipment capacities, equipment options, electrical power voltage/phase, special features, and accessories. Label data sheets with same designation as used on contract documents. Provide for all items requiring maintenance and for items that may require replacement over a 30-year period or be revised due to an Owner building improvement.
 - 3. Shop Drawings: Provide copy of final shop drawings as approved for each area where shop drawings were required to be submitted.
- B. Technical O&M Data: Provide for each equipment or item requiring maintenance. Label O&M data to clearly indicate which equipment on the project it applies to (use same designation as used in the Contract Documents). Data to include:
 - 1. Manufacturer's operating and maintenance manuals and instructions.

2. Itemized list of maintenance activities and their scheduled frequency.
 3. Maintenance instructions for each maintenance activity.
 4. Manufacturer's parts list.
 5. Size, quantity and type of fuses (as applicable).
- C. Sources: Provide names, addresses, and phone numbers for local manufacturer's representative, service companies, and parts sources for mechanical system components.
- D. Start-Up Reports: Include copies of all equipment and system start-up reports.
- E. Balancing Report: Include a full copy of the balancing report under a dividing tab for the specification section (or building system) where this work is specified. Where balancing is provided by others, obtain from the balancer a copy of the report to insert in the O&M's.

2.03 MAINTENANCE SCHEDULES

- A. General: Provide Maintenance schedules with an itemized list of maintenance activities and their scheduled frequency (i.e., weekly, monthly, semi-annually, etc.) for item requiring maintenance.
- B. Special Maintenance: List any critical maintenance items or areas requiring special attention.
- C. Start-Up/Shut-Down: Provide normal start-up, operating, and shut-down procedures; emergency shut-down procedures; and (where applicable) seasonal shut-down procedures.

2.04 REDUCED RECORD DRAWINGS

- A. Reduced As-Built Drawings: Provide reduced as-built construction drawings for fire suppression, plumbing, HVAC. Drawings' size shall be 11" x 17", except where such size precludes the reading of portions of the drawing, a larger size may be used.

PART 3 - EXECUTION

NOT USED

END OF SECTION 20 02 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Division 21 - Fire Suppression.
- C. Division 22 - Plumbing Systems.
- D. Division 23 - Heating, Ventilation, and Air Conditioning (HVAC) Systems.

1.02 WORK INCLUDED

- A. General Mechanical System Requirements.
- B. Mechanical System Motors.
- C. Identification and Labeling.

1.03 DEFINITIONS

- A. Abbreviations and Terms: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary, Fourth Addition and in the ASHRAE Handbook of Fundamentals, latest edition.
- B. "As required" means "as necessary to form a safe, neat, and complete working installation (or product), fulfilling all the requirements of the specifications and drawings and in compliance with all codes."
- C. "Concealed" means "hidden from view" as determined when areas are in their final finished condition, from the point of view of a person located in the finished area. Items located in areas above suspended ceilings, in plumbing chases, and in similar areas are considered "concealed." Items located in cabinet spaces (e.g. below sinks) are not considered concealed.
- D. "Coordinate" means "to accomplish the work with all others that are involved in the work by: directly discussing the work with them, arranging and participating in special meetings with them to discuss and plan the work being done by each, obtaining and completing any necessary forms and documentation required for the work to proceed, reaching agreement on how parts of the work performed by each trade will be installed relative to each other both in physical location and in time sequence, exchanging all necessary information so as to allow the work to be accomplished with a united effort in accordance with the project requirements".
- E. "Finished Areas" means "areas receiving a finish coat of paint on one or more wall surface."
- F. "Mechanical", where applied to the scope of work, includes all project fire suppression systems, plumbing systems, and HVAC systems, for these systems and all work covered by specification Divisions 20, 21, 22, and 23. Such work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.

- G. The term "related documents" (as used at the beginning of each specification section), and the Specification Divisions and Sections listed with it, is only an indication of some of the specification sections which the work of that section may be strongly related to. Since all items of work relate to one another and require full coordination, all specification sections, as listed in the Table of Contents, shall be considered as being "related documents", and shall be considered (by this reference) in the same manner as if they had all been listed under the term "related documents" in each specification section.
- H. "Work included" (as used at the beginning of each specification section), and the items listed with it, is only an indication of some of the items specified in that Section and is in no way limiting the work of that Section. See complete drawings and specifications for all required work.
- I. "Verify" means "Contractor shall obtain, by methods independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work". Where used as "verify existing" the reference is to all existing items related to the work (i.e. piping systems, duct systems, electrical power, controls, structural conditions, space available, building construction type, etc.); the "verify" definition shall include "Confirm by means independent of any existing field labeling and independent of the Architect/ Engineer and Owner what the existing piping (or duct) system contains, sizes, what the flow direction is, what normal pressures/temperatures are, what other systems and areas the piping (or duct) is interconnected to; what the existing control voltages/signal types are by direct measurement; what the existing electrical power voltages and phases are by direct measurement; and additional field verification and coordination to ensure that compatible products are provided, correct connections made, and all work performed to allow for fully functioning systems." "Means independent of existing field labeling" shall include methods such as: the use of exterior pressurized sources to pressurize piping system lines, use of flow tests with dyes, physical tracing of piping and all connections to, electronic detection methods, electronic/electric line tracing, electrical measurements, physical disassembling of system, excavation or uncovering of concealed systems, use of insertion cameras and similar efforts.
- J. "Substitution": As applied to equipment means "equipment that is different than the 'Basis of Design' equipment scheduled on the drawings (or otherwise indicated in the contract documents)".

1.04 GENERAL REQUIREMENTS

- A. Scope: Furnish all labor, materials, tools, equipment, and services for all mechanical work. This section applies to all Division 20, 21, 22, 23 specifications and to all project mechanical work. All mechanical equipment and devices furnished or installed under other Divisions of this specification (or by the Owner) which require connection to any mechanical system shall be connected under this division of the Specifications.
- B. General: All work shall comply with Division 00, General Conditions, Supplementary Conditions, Division 01, and all other provisions of the Contract Documents.
- C. Code:
 - 1. Compliance: All work shall be done in accordance with all applicable codes and ordinances. Throughout the Project Documents, items are shown or specified in excess of code requirements; in all such cases, the work shall be done so that code requirements are exceeded as indicated. Comply with code accessibility requirements.
 - 2. Documentation: Maintain documentation of all permits and code inspections for the mechanical work; submit documentation showing systems have satisfactorily passed all AHJ inspections and requirements.

3. Code Knowledge: Contractor and workers assigned to this project shall be familiar and knowledgeable of all applicable codes and ordinances. Code requirements are typically not repeated in the Contract Documents. By submitting a bid, the Contractor is acknowledging that the Contractor and workers to be utilized on this project have such knowledge.
 4. Proof of Code Compliance: Prior to final completion, satisfactory evidence shall be furnished to show that all work has been installed in accordance with all codes and that all inspections required have been successfully passed. Satisfactory evidence includes signed inspections by the local code authority, test lab results, qualified and witnessed field tests, and related acceptance certificates by local code authorities, and field notes by the Contractor as to when all inspections and tests occurred.
- D. Complete Systems: Furnish and install all materials, appurtenances, devices, and miscellaneous items not specifically mentioned herein or noted on the drawings, but which are necessary to make a complete working installation of all mechanical systems. Not all accessories or devices are shown or specified that are necessary to form complete and functional systems.
- E. Review and Coordination:
1. General: To eliminate all possible errors and interferences, thoroughly examine all the Drawings and Specifications before work is started, and consult and coordinate with each of the various trades regarding the work. Such coordination shall begin prior to any work starting, and continue throughout the project.
 2. Suppliers: Suppliers of products shall review the documents to confirm that their products are suitable for the application and that all manufacturers requirements and recommendations have been satisfactorily addressed in the Contract Documents. Where not addressed the supplier shall notify bidders and the Engineer prior to bidding to resolve any issue or include in their bid an adequate amount to resolve the issue.
- F. Conflicts and Discrepancies: Notify the Architect/Engineer of any discrepancies or conflicts before proceeding with any work or the purchasing of any materials for the area(s) of conflict until requesting and obtaining written instructions from the Architect/Engineer on how to proceed. Where conflicts occur, the most expensive and stringent requirement (as judged by the Architect/Engineer) shall prevail. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed shall be done at the Contractor's expense.
- G. Drawings and Specifications: Drawings and specifications are complementary and what is called for in either is binding as if called for in both. The drawings are diagrammatic and show the general arrangement of the construction and therefore do not show all offsets, fittings and accessories which are required to form a complete and operating installation. Mechanical work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.

H. Offsets/Fittings:

1. Piping Systems: Include in bid all necessary fittings and offset to completely connect up all systems, maintain clear access paths to equipment, and comply with all project requirements. Offsets are required to route piping around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payment or "extras" will be granted for the Contractor's failure to correctly estimate the number of offsets and fittings and labor required. Contractor is advised that equipment and fixture connections may require more than 20 elbows per plumbing fixture and coil per pipe line.
2. Duct Systems: Include in bid all necessary fittings, offsets, and transitions to completely connect all systems, maintain clear access paths, and comply with all project requirements. Offsets are required to route piping around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payments or "extras" will be granted for the Contractor's failure to correctly estimate number of offsets, fittings, transitions and labor required. Contractor is advised that transitions are required at connections to all equipment, to all air inlets/outlets, crossing of beam lines, at crossing with piping, and similar locations.

- I. Design: The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed shall be provided by the Contractor. All design by the Contractor shall be performed by individuals skilled and experienced in such work, and where required by local code (or elsewhere in the documents) shall be performed by engineers licensed in the State where the project is located. Include in bid the costs of all such project design; including engineering, drafting, coordination, and all related activities and work. Such designs services are required for many building systems; including but not limited to ductwork at equipment, piping at fixtures and equipment, hanger/support systems, temporary duct/piping systems, mechanical offsets/adjustments to suit other system, and for methods/means of accomplishing the work.

- J. Special Tools: Furnish to the Owner one complete set of any and all special tools such as odd size wrenches, keys, etc. (allen wrenches are considered odd), which are necessary to gain access to, service, or adjust any piece of equipment installed under this contract. Each tool shall be marked or tagged to identify its use. Submit a written record listing the special tools provided, date, and signed by the Owner's representative receiving the tools.

- K. Standards and References: Shall be latest edition unless a specific edition, year, or version is cited, or is enforced by the AHJ.

L. Warranties:

1. General: Products and workmanship shall be warranted to be free from all defects, capable of providing satisfactory system operation, and conforming to the requirements of the Contract Documents. Include in the project bid all costs associated with project warranties to ensure that the warranty extends for the required period; possible project delays and failure by others to complete their work may cause the start of the warranty period to be delayed. The Contractor shall be responsible for increasing the warranty dates by corresponding amounts to provide the required warranty periods.

2. Basic Project Warranty: As described in the General Conditions, Supplementary Conditions, and Division 01. See individual specification sections for specific warranty requirements. Start date and duration are as indicated in General Conditions, Supplementary Conditions, and Division 01. Where not indicated otherwise, the basic project warranty shall start at project substantial completion and be for one year.
 3. Special Warranties: See individual specification sections for special warranty requirements and extended warranty periods beyond the basic project warranty.
- M. Permits and Fees:
1. Obtain and pay for all permits, licenses, fees and inspections as required by the Code and as specified herein (unless noted otherwise).
 2. Pay all charges made by any utility company or municipality for material, labor or services incident to the connection of service (unless noted otherwise).
- N. Commissioning: All mechanical systems are to be commissioned per Section 20 08 00. The Contractor has specific responsibilities for scheduling, coordination, startup, test development, testing and documentation. At a minimum, the Contractor shall provide a documented and signed record to verify that all equipment and systems installed under this contract have been inspected and functionally tested to verify full compliance with the contract specifications. In many cases, this shall require the Contractor to create or otherwise provide procedures and checklists for approval by the Commissioning Consultant prior to the start of functional testing. Reference Division 01 and coordinate all commissioning activities with the Commissioning Consultant.

1.05 SUBSTITUTIONS

- A. General: See Division 00 and 01 for information and requirements regarding substitutions. Manufacturers not scheduled on the plans or listed as "Acceptable Manufacturers" require prior approval and shall submit a substitution request form (see Division 01 for requirements and limitations). See Paragraph 2.01 this specification section regarding "Acceptable Manufacturers".
- B. Redesign:
1. The Contract Documents show design configurations based on particular manufacturers. Use of other manufacturers' products (i.e. substitutions) from what is shown (or specified) may require redesign of mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction to accommodate the substitution.
 2. Review the installation requirements for substitutions and provide redesign of all affected construction. The redesign shall be equal or superior in all respects to the Architect/Engineer's design (as judged by the Architect/Engineer), including such aspects as equipment access, ease of maintenance, utility connection locations, unit electrical requirements, noise considerations, unit performance, and similar concerns.
 3. Redesign shall be done by the Contractor and shall meet the requirements and have the approval of the Architect/Engineer prior to beginning work. Apply for and obtain all permits and regulatory approvals.
- C. Construction Modifications: Provide all required construction modifications to accommodate the substituted products; this includes all mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction. Construction modification shall comply with code, specifications, and be equal to designed construction.
- D. Costs: Cost of redesign, construction costs, and all additional costs incurred to accommodate substituted equipment shall be borne by the Contractor.

- E. Submittals: In addition to other required submittals, submit shop drawings showing the redesign for substituted equipment; submittal shall include installation plans and sections, connecting services (i.e. ducts, piping, electrical) locations and routing, required service clearances, and related installation details. Submit data required by other disciplines to allow review of the impact of the substitution (i.e. weights, electrical).

1.06 QUALITY ASSURANCE

- A. Experience: All work shall be performed by individuals experienced and knowledgeable in the work they are performing, and experienced with the same type of systems and building type as this project. By virtue of submitting a bid, the Contractor is acknowledging that workers to be utilized on this project have such experience and knowledge. Upon request of the Engineer, submit resumes showing the work history, training, and types of projects worked on, for individuals assigned to this project.
- B. Code: Utilize workers experienced and knowledgeable with codes pertaining to their work; verify code compliance through-out the project.
- C. ASME: All pressure vessels, pressure vessel safety devices, and pressure vessel appurtenances shall comply with the standards of, and bear the stamp of ASME.
- D. Quality Assurance Checks: Prior to ordering products and making submittals, confirm the following for each:
 - 1. General: Product is suitable for the intended purpose and complies with the Contract Documents.
 - 2. Manufacturer: Product's manufacturer is listed as an acceptable manufacturer in the Contract Document's or a substitution request (where allowed) has been submitted and the manufacturer has been listed as acceptable.
 - 3. Electrical (for products requiring electrical power):
 - a. Product is for use with the voltage/phase as indicated on the electrical plans (or for the electrical circuit the item will be connected to).
 - b. Product's ampacity requirements (MCA) do not exceed that indicated on the electrical plans (or for the electrical circuit the item will be connected to).
 - 4. Weight: Product's weight is no greater than that indicated.
 - 5. Space Verification: Product will fit in the space available, and along the path available to install the item, will have adequate service clearances, and will not impede on any clearances required for other items in the space the item will be located.
 - 6. Installation: A suitable method for installing the product has been selected which meets the project schedule and other requirements.
 - 7. Lead Time: The product's fabrication, shipping, and delivery period meets the project schedule requirements.
 - 8. Substituted Equipment: Where equipment is not the basis of design confirm all requirements for substituted equipment have been met and shop drawings of construction revisions have been (or are being) prepared.
 - 9. Controls: Item is compatible with the controls it will be connected to and has been coordinated with the firm providing the project control work.
 - 10. Listing: Item is Listed when required to be as such. And if the item is to be installed as part of a Listed system or assembly, it is compliant with the Listing of the overall system or assembly.
 - 11. Existing Buildings/Systems: Product size, weight, connecting services (i.e. electrical, controls, power, plumbing, etc.) are configured and suitable for existing items they connect to or interface with.

1.07 SUBMITTALS - GENERAL

- A. Variations: Only variations that are specifically identified as described herein will be considered. Provide with the submittal (in addition to other information required): description of the proposed variation, entity who is proposing the variation, why the variation is being proposed, any cost changes associated with the variation, and any other pertinent data to allow for review. Failure to submit information on the variation as described will result in the submittal review being conducted without considering the variation.
- B. Quality Assurance: By submitting an item for review, the Contractor is claiming that all "Quality Assurance Checks" (see paragraph 1.06 this specification Section) have been performed and satisfactorily passed and no further comment from the submittal reviewer is required for the "Quality Assurance Checks".
- C. Product Submittals - Information Required:
 - 1. Manufacturer's catalog information, containing product description, model number, and illustrations. Mark clearly to identify pertinent information and exact model and configuration being submitted.
 - 2. List of accessories and options provided with product.
 - 3. Product dimensions and clearances required.
 - 4. Product weight.
 - 5. Submittal identified with product name and symbol (as shown on the drawings or written in the specifications) and specification Section and paragraph reference.
 - 6. Performance capacity and characteristics showing compliance with the Contract Documents.
 - 7. Manufacturer's and local manufacturer's representative names, addresses, and phone numbers.
 - 8. For equipment requiring piping or duct connections:
 - a. Type of connections required.
 - b. Size and locations of connections.
 - 9. For electrically operated equipment:
 - a. Number and locations of electrical service connections required.
 - b. Voltage required.
 - c. Fuse or circuit breaker protection requirements.
 - d. Motor starter requirements; if motor starter is furnished with the equipment, submit product information on motor starter.
 - 10. For equipment requiring control connections:
 - a. Type of control signals required.
 - b. Control communication protocol.
 - c. Information on control devices furnished with equipment.
 - d. Location of control connections.
 - 11. Manufacturer's installation instructions.
 - 12. See each specification Section for additional submittal requirements.
- D. Shop Drawing Submittals: Provide for the following systems:
 - 1. Fire Suppression Systems.
 - 2. For any parts of any system which are to be installed differently than as shown on the drawings.
 - 3. Construction revisions to accommodate Substituted Equipment.

4. Other areas/work as noted in the Contract Documents.
5. For those systems requiring shop drawings, reference system's specification Section for additional requirements.

1.08 SCHEDULE OF VALUES

- A. Breakdown: Provide schedule of values for the following categories (as a minimum); provide a materials and labor breakdown for each category.
1. Mobilization.
 2. General Project Management, General Design, General Coordination, Submittals.
 3. Insulation.
 4. Fire Suppression:
 - a. Engineering and shop drawings.
 - b. Rough-in.
 - c. Trim.
 5. Plumbing:
 - a. Underground.
 - b. Aboveground.
 - c. Fixtures and Trim.
 6. HVAC System:
 - a. Equipment.
 - b. HVAC Ductwork and Accessories.
 7. Balancing.
 8. Commissioning.
 9. O&M Manual, Record Data.
 10. Punchlist, Closeout, Owner Training.
- B. Closeout: The dollar value for "Punchlist, Closeout, and Owner Training" shall in no case be less than 3% of the total dollar value of the mechanical work.

1.09 RECORD DOCUMENTS

- A. Field Record Drawings: Maintain a set of full size contract plans at the project site upon which all changes from the as-bid plans are noted. Plans shall be maintained clean, dry and legible; with information recorded concurrent with construction progress. These plans shall also include actual locations (with dimensions) of all underground and concealed mechanical systems. Connection points to outside utilities shall be located by field measurements and so noted on these record drawings. All addenda, change order, field orders, design clarifications, request for information, and all other clarifications and revisions to the plans shall also be made a part of these record drawings. Plans shall be available for weekly review by the Architect/Engineer. Label drawing "As-Built" with date, name of Contractor, and name of individual overseeing the work.
- B. Final Field Record Drawings Submittal: Deliver to the Architect/Engineer the original Field Record drawings and one full size copy.

1.10 PRODUCT HANDLING, PROTECTION AND MAINTENANCE

A. Protection:

1. Protect all products from contamination, becoming unclean, and from damage of any kind and whatever cause; when being handled, in storage, and while installed, until final project acceptance.
2. Completely cover fixtures, motors, control panels, equipment, and similar items to protect from becoming unclean and damage of any kind.
3. Protect premises and work of other trades from damage due to Mechanical work.

B. Openings: Cap all openings in pipe, ductwork and equipment to protect against entry of foreign matter until all work that could cause unclean conditions or damage is complete (including work that has dust or fumes associated with it). Caps shall be of sufficient strength and seal integrity to prevent entry of water or fumes for the most extreme conditions they may be exposed to (i.e. high velocity water spray, high winds, concrete splash, etc.)

C. Storage: Provide properly conditioned and sheltered storage facilities for products to prevent damage of any kind and to maintain new condition. Provide adequate venting arrangements to avoid condensation damage.

D. Operation and Maintenance:

1. General: Inspect products periodically to confirm conditions and maintenance needs. Keep records of inspections and (upon request) forward to the Architect/Engineer prior to project final acceptance. Operation and Maintenance shall be in accordance with manufacturer's written procedures and recognized best maintenance practices. Keep records of maintenance and (upon request) forward to the Architect/Engineer prior to project final acceptance.
2. Stored Products: Provide maintenance (i.e. equipment rotation, lubrication, flush, cleaning, etc.) and inspection on products while stored to maintain new condition.
3. Installed Products: Provide maintenance and inspection of products and operate mechanical systems until substantial completion or specified Owner Instruction has been provided (whichever is later). Maintenance shall include all labor and materials and all manufacturers' recommended maintenance (i.e. strainer cleaning, filter changes, bearing lubrication, belt tensioning, etc.). In addition to scheduled maintenance, review all equipment periodically to allow detection of improper operation or any special maintenance needs; review shall be consistent with best practices for the product but in no case less than a site visit every two weeks. Document all maintenance activities.

E. Damaged Products: Damaged products shall be replaced with new. Where damage is limited to paint (or similar finish), the product may remain if the finish is restored to a new condition (as judged by the Architect/Engineer).

1.11 JOB CONDITIONS

A. Special Requirements:

1. Maintain emergency and service entrance usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic.
2. Coordinate startup and shutdown of all mechanical systems and utilities with related trades and the Owner's representative.
3. Coordinate all construction activities with the Owner's Representative and cooperate fully so as to minimize conflicts and to facilitate Owner usage of the premises during construction.

4. Provide temporary services to occupied areas to accommodate Owner's use during construction. All temporary work shall comply with same specifications as for new work and be of same quality.
- B. Downtime Restrictions:
1. Contractor shall notify the Owner at least 72 hours in advance of any intended shut-down of any building services or systems and obtain Owner approval prior to proceeding.
 2. Electrical power to the building shall not be interrupted at any one time for more than 15 minutes.
- C. Schedule of Work: Arrange work to comply with schedule of construction, and so as not to violate any downtime restrictions, and to accommodate the Owner's scheduled use of the premises during construction.

1.12 ENGINEER FIELD REVIEWS AND TEST WITNESSING

- A. General: Arrange construction schedule and notifications to the Engineer to accommodate Engineer's schedule and the possibility of review times occurring up to 14 days after notification, and for the possible failure to satisfactorily pass Engineer's reviews requiring revisions and re-reviews.
- B. Notification: Notify Engineer at least 7 days in advance of readiness for reviews; arrange mutually agreed upon times for the reviews to occur.
- C. Access: Provide ladders, any special tools and safety equipment to allow Engineer's access to areas and equipment. Remove and reinstall ceiling tiles, access panels, and similar items where requested to allow for reviews.
- D. Review of Systems with Equipment:
1. Prior to Engineer's review, system's equipment shall have received specified start-up and be substantiated by a written report.
 2. Prior to Engineer's review, systems shall have been operating properly for at least five consecutive days prior to the scheduled review date.
 3. Personnel shall be present to operate the system's equipment and controls, and to vary system settings as directed by the Engineer to allow for a review of operation over a range of settings.
- E. Re-Review Fees: The project budget allows for one review by the Engineer for specified reviews and witnessing. See Division 00 and 01 for compensation to the Engineer for required re-reviews.
- F. Re-Review Fees: The project budget allows for one review by the Engineer for specified reviews and witnessing. The Engineer shall be compensated for additional reviews required due to failed work or failed tests; such compensation will include travel time and mileage and be billed at the Engineer's current billing rates. See Division 00 and 01 for additional information.

1.13 REFERENCES

- A. ASME A13.1: Scheme for the Identification of Piping Systems.
- B. NFPA 791: Unlabeled Electrical Equipment Evaluation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. General: Any reference in the Specifications or on the Drawings to any article, device, product, material, fixture, form or type of construction by manufacturer, name, make, model number, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The manufacturers listed as Acceptable Manufacturers may bid the project for the items indicated without submitting a substitution request; however that does not relieve the products from having to comply with the Contract Documents.
- B. Substitutions: Products by manufacturers listed as "Acceptable Manufacturers" (other than those listed as the "Basis of Design") are considered substitutions and shall comply with the requirements for substitutions. See Paragraph titled "Substitutions" in Part 1 of this specification section.
- C. Considerations: In reviewing a manufacturer for acceptance, factors considered (as compared to the specified item) include: engineering data showing item's capacity, performance, proper local representation of manufacturer, likelihood of manufacturer's future local support of product, service availability, previous installations, previous use by Owner/Engineer/Architect, product quality, availability/quality of maintenance and operation data, electrical requirements, capacity/performance, acoustics, physical dimensions, weight, items geometry and access requirements, utility needs, and similar concerns.
- D. Limitations of the Term "Acceptable Manufacturer": The listing of a manufacturer as an Acceptable Manufacturer does not necessarily mean that the products of that manufacturer are equal to those specified. The listing is only an indication of those manufacturers which have represented themselves as being capable of manufacturing, or have in the past manufactured, items equal to those specified. The burden to review products to confirm equivalency with the specified products is on the Contractor. The Architect/Engineer shall be the final judge as to whether an item is equal to that specified.
- E. Quality: Products provided by Acceptable Manufacturers shall be equal to or superior to the specified manufacturer's item in function, appearance, and quality, and shall fulfill all requirements of the Contract Documents. The Architect/Engineer shall be the judge as to whether an item meets these requirements or not.
- F. Manufacturer: To be considered as being made by a particular manufacturer, the product must be made directly by the manufacturer and have the manufacturer's name (or nameplate with name) affixed to the product (or on the product container where direct labeling is not possible). Example: manufacture "A" is listed as an acceptable manufacture; manufacturer "B" is not listed as an acceptable manufacturer; manufacturer "A" owns "B"; products from "B" do not qualify as being made by an acceptable manufacturer by virtue of ownership.

2.02 PRODUCTS - GENERAL

- A. **Standard Products:** Products shall be standard products of a manufacturer regularly engaged in the manufacture of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two year use shall include applications of equipment and materials under similar circumstances and of similar size. The two year's experience must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Except that equipment changes made solely to satisfy code requirements, to improve unit efficiency, or to comply with unique project requirements are not required to have two year prior operation.
- B. **Latest Design:** Products shall be the latest design and version available from the manufacturer, including software. Discontinued products shall not be used.
- C. **Service Support:** Qualified permanent service organizations for support of the equipment shall be located reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.
- D. **Manufacturer's Nameplate:** Equipment shall have a manufacturer's nameplate bearing the manufacturer's name, address, model number, serial number, and additional information as required by code. Nameplate shall be securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable. Nameplate shall be of durable construction, easily read, with lettering minimum size 12 font.
- E. **Compatibility:** All components and materials used shall be compatible to the conditions and materials the items will be exposed to. All items exposed to the weather shall be galvanized, or be of stainless steel or similar corrosion resistant material.
- F. **Sizes:** Sizes indicated for products manufactured to standardized sizes (e.g. pipe, pipe fittings, valves, material gauges, etc.) are minimums. During bidding confirm that the sizes are available and meet project requirements. Where indicated sizes are not available provide the next larger available size; confirm this larger size will suit the construction and meet Contract Document requirements prior to ordering. Such size revisions are subject to Engineer's review; indicate size revisions on the product submittal and why the size is being revised.
- G. **Non-Specified Items:** Materials shown on the drawings but not specified shall be provided as shown and as required to suit the application illustrated and intended and shall be of commercial quality, consistent with the quality of similar type items provided on the project. Not all items shown on the drawings necessarily have a corresponding specification; such items shall be provided per this paragraph and so as to provide complete, finished, fully functioning mechanical systems.
- H. **Weights:** Do not exceed the weights shown unless added structural supports are provided. Such supports shall meet the requirements of the project Structural Engineer. The Contractor shall bear all costs for all redesign and added supports to accommodate heavier equipment. The Contractor shall reimburse the Engineer for all time associated with all review and analyses regarding the use of equipment heavier than that indicated.
- I. **Temperature/Pressure Rating:** All materials and components furnished shall be suitable for the temperature and pressures they will be exposed to. Contractor shall consider possible operating modes to ensure proper material ratings.
- J. **Standardization:** All products of the same type shall be by the same manufacturer and have the same characteristics and features to allow for Owner's standardization.

- K. Model Numbers: Any reference to a manufacturer's "model number" is a reference to a manufacturer's series number or type of product, and is not a complete "model number" in having all the necessary numbers/letters to convey all of the features, accessories, and options that are required. These series numbers are only meant to convey a type of product that may meet the project requirements. Where conflicts or discrepancies occur regarding a listed manufacturer's series or "model" number and specified capacities or features, the more stringent and expensive shall prevail.
- L. Application and Suitability: Products shall be designed and intended for: commercial and institutional application, for the use indicated, and be suitable for the operating conditions they will be exposed to. Firms supplying the products shall review the documents and related site and environmental data to confirm compliance. By making product submittals and using products they are being represented as appropriate for the project and application shown.
- M. Lead Free: All solder, valve components, drinking fountain components, and other items in contact with potable water shall be lead free.

2.03 ELECTRICAL

- A. General: All electrical devices, wiring, products, and work shall comply with the Division 26 specifications and code. See drawings for building occupancy type, types of construction, and areas which may require special wiring methods or other electrical work.
- B. Equipment: All equipment requiring power shall be factory wired to an equipment mounted junction box (or an accessible compartment with power terminals or electrical device) arranged to allow for connection of electrical power.
- C. Overcurrent protection: Circuit breakers, circuit breaker disconnects, fuses, and other current limiting devices indicated to be provided, shall be rated to suit the maximum overcurrent rating of the item served, and have other ratings, as required by code. Circuit breakers for HVAC and refrigeration unit equipment shall be UL listed by HACR type.
- D. Short Circuit Current Rating (SCCR): All equipment (or components) requiring the use of electrical power shall have a SCCR value to comply with code. The minimum rating shall be 65,000 Amps RMS Symmetrical unless a lower value is indicated on the plans or allowed by code. Where the Contractor wishes to utilize equipment having a lower rating, the Contractor shall be responsible to provide calculations substantiating that a lower SCCR is acceptable (and complies with code), or make revisions to the electrical system to accommodate the proposed equipment (or components).
- E. Product Certification (Listing): Products which require connection to electrical power shall be certified (i.e. listed) by a Nationally Recognized Testing Laboratory (NRTL) and be labeled (in a conspicuous place) with such certification (or certification mark). Certification shall comply with code, OSHA Standards, and Authority Having Jurisdiction (AHJ) requirements. NRTL's shall be recognized as such by OSHA and the AHJ. Certification shall be for the complete assembly (approval of individual components is not acceptable). Field evaluations to obtain certification shall be performed by accredited product testing laboratories acceptable to the AHJ and Engineer, be performed in accordance with code, NFPA 791, recognized practices, and be labeled to identify the certification. Certification is not required where the AHJ does not require it.

2.04 MOTORS

- A. General: Where a piece of equipment specified includes an electric motor, the motor shall be factory installed and mounted. Motor starters and motor electrical disconnect switches shall be provided by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26 (or another Division). Wiring from the motor to motor starters and to electrical disconnects shall be by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26.
- B. Acceptable Manufacturers: General Electric, TECO-Westinghouse, Reliance, Gould, Century, Baldor, U.S. Motors, Marathon, and acceptable manufacturers for the equipment (see individual specification sections).
- C. Type: Motor type shall comply with code and applicable standard requirements and be configured to suit the application. Motors located indoors shall be open frame, drip-proof type, unless indicated otherwise. Motors located outdoors exposed to weather shall have corrosion resistant finish and shall be totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV) type, unless indicated otherwise.
- D. Listing: All motors shall be UL listed.
- E. Efficiency: Motor efficiencies shall comply with code. Fractional horsepower motors shall be the electronically commuted (EC) type with speed control where noted and where non-EC motors are not available which comply with code efficiency requirements. Motor power factor shall comply with code, local utility requirements, and as indicated. Provide added power factor correction devices as necessary to comply.
- F. Sizing: Motors shall not be smaller than indicated and of adequate size to start and drive the respective equipment when handling the quantities specified without exceeding the nameplate full load current at the conditions indicated and for the expected operating conditions. If it becomes evident that a motor furnished is too small to meet these requirements as a result of the Contractor using substituted equipment or having revised the system arrangement, the Contractor shall replace it with a motor of adequate size at no additional cost to the Owner. Contractor shall also arrange with the Electrical Contractor to increase the size of the wiring, motor starter and other accessories as required to serve the larger motor at no additional cost to the Owner.
- G. Service Factor: Minimum 1.15.
- H. Variable Frequency Drive (VFD) Applications: Motors used with Variable Frequency Drives (VFD's) shall be rated for such use per IEEE standards and have shaft grounding protection.
- I. EC Motors (ECM):
 - 1. General: Electronically commutated type with integral inverter to convert AC power (of voltage/phase indicated) to DC power, and solid state circuitry to vary output power and speed of motor. Motor shall have permanently lubricated bearings with an L10 life of 100,000 hours at expected operating conditions. Motor shall have rotor position and rotation detection as required for operation.
 - 2. Speed Range: Motor speed shall be controllable down to 25% of full speed.

3. Manual Speed Control: Provide with manual speed adjustment dial for motor speed control. Dial shall be motor mounted unless indicated otherwise, operable by a screwdriver or by hand. Motor mounted controls shall be factory wired. Remote mount dials shall be hand operable (i.e. no tools required), shall be for mounting on a standard 2 x 4 electrical junction box, and be able to be located up to 100 feet remote from the motor. Motor control wiring for remote mount dials shall be factory wired from the motor to an equipment mounted junction box (with field supplied wiring from this J-box to the remote dial).
4. EMCS Control: Motor speed shall be adjustable via a remote 0-10V input signal (unless noted otherwise) from the building EMCS. Control wiring shall be factory wired from the motor to an equipment mounted junction box. EMCS control is not required where not indicated to be provided or where not utilized as part of the control sequence.
5. Control Power: Provide with integral transformer, factory wired, as needed to power motor controls. Locate transformer at motor or equipment.

2.05 IDENTIFICATION AND LABELS

- A. General: All piping, valves, and mechanical equipment shall be labeled. Labels in concealed accessible spaces shall be reviewed and verified by Architect/Engineer prior to being concealed.

B. Piping:

1. Type: Self-sticking colored identification markers, lettered to identify the pipe contents, and banded at each end with arrow tape indicating the direction of flow. Markers shall be similar and equal to Brady "System 1" and Seton "Opti-Code" markers. Spray painted stencil labeling is not acceptable. Some labels may be special order.
2. Identification Colors: Comply with ASME A13.1, and as follows:

| <u>Conveyed Material/System</u> | <u>Background</u> | <u>Letters</u> |
|---------------------------------|-------------------|----------------|
| Potable Water | Green | White |
| Waste/Vent | Gray | White |
| Non-Potable Water | Yellow | Black |

3. Lettering: Lettering shall identify the material conveyed in each pipe and shall match the designation used on the plans, but without abbreviations. Systems which have supply and return piping shall have piping labeled as such (i.e. heating water return, heating water supply, etc.). Systems that have different pressures shall be labeled to indicate such (i.e. Steam-Low Pressure, Steam- Medium Pressure, Natural Gas-Low Pressure, Natural Gas-Medium Pressure, etc.).
4. Size: Size of letters and color field shall comply with ASME A13.1, repeated here for convenience:

| <u>Outside Diameter of Pipe or Covering</u> | <u>Length of Color Field</u> | <u>Size of Letters</u> |
|---|----------------------------------|------------------------|
| 3/4 to 1-1/4 Inches | 8 Inches | 1/2 Inches |
| 1-1/2 to 2 Inches | 8 Inches | 3/4 Inches |
| 2-1/2 to 6 Inches | 12 Inches | 1-1/4 Inches |
| 8 to 10 Inches | 24 Inches | 2-1/2 Inches |
| Over 10 Inches | 32 Inches | 3-1/2 Inches |

5. Applications: Install on all exposed piping adjacent to each shut-off valve, at branches to indicate changes of direction, where pipes pass through walls and floors, on 20 foot centers or at least one in each room on each pipe. Markers shall be installed on all concealed accessible piping (i.e., piping above suspended ceilings, behind access doors, in accessible chases, etc.) near the point of access. For piping above suspended ceilings, markers shall be installed the same as if the piping was exposed (i.e., same as if the suspended ceiling was not in place). Markers shall be installed so as to be easily read by a person standing on the floor. Provide additional flow arrows at each pipe connection at valves having more than 2 ports (i.e. 3-way control valves).
6. Other Requirements: See other specification Sections for additional requirements.

C. Equipment:

1. Labels: Laminated plastic (or phenolic) material, 1/16-inch thick, with black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Minimum 2-inch high (unless indicated otherwise or required due to equipment size) with length to contain required lettering. Label shall be pre-drilled and be mechanically fastened to the equipment. Prior to making labels, submit a list of all proposed labels.
2. Lettering: All caps, engraved on label, with equipment designation (same designation as used on Contract Drawings; e.g. HVAC-101, EF-22, CP-1A). Air handling equipment (i.e. VAV terminal units, fans, etc.) labels shall include the room names and numbers or area of building served (use final installed room designations). Where systems serve portions of the building (i.e. wings or floors), include on label the area served. Lettering shall be in multiple rows, with equipment label on top row. Equipment lettering to be 5/8-inch high; area served lettering to be 3/8-inch high (except that smaller lettering may be used if necessary to fit label size).
3. Application: All scheduled mechanical equipment shall be labeled. The label shall be located on a side of the equipment so as to be easily read, with the marking visible to a person standing at the access level near the equipment (assuming any necessary access to a concealed unit has been made).

D. Electrical Devices:

1. Labels: Minimum 1/4-inch high (unless indicated otherwise) lettering, all caps, engraved on laminated plastic or phenolic material, at least 1/16-inch thick. Laminated plastic (or phenolic) shall have black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Label shall be pre-drilled and be mechanically fastened to the item; where mechanical fastening is not possible use 3M VHB double sided specialty tape No. 4945. Prior to making labels, submit a list of all proposed labels.
2. Lettering: Label shall identify the item served (using the same designation as indicated on the Contract Drawings), the source of power (by panel and circuit breaker), and comply with code.

E. Concealed Items:

1. General: Equipment, valves, dampers and similar items concealed above accessible ceilings shall have the ceiling marked below the item to identify the item and its location.
2. Marking System: The marking system shall consist of an engraved phenolic label, minimum 1/16-inch thick and 3/4-inch high with 1/2-inch high lettering. Label shall be black with white lettering. Apply labels to ceiling grid system using 3M double sided tape (3M VHB #4945).
3. Labeling: Shall identify equipment using the same designation indicated on the plans; valves shall be identified by size and system (e.g. EF-1, VAV-101, VALVE 4" CW). Prior to making labels, submit a list of all proposed labels.

PART 3 - EXECUTION

3.01 GENERAL

- A. Workmanship: Furnish and install products to provide complete and functioning systems with a neat and finished appearance. If, in the judgment of the Architect/Engineer, any portion of the work has not been installed in accordance with the Contract Documents and in a neat workmanlike manner, or has been left in a rough, unfinished manner, the Contractor shall be required to revise the work so that it complies with the Contract Documents, at no increase in cost to the Owner.
- B. Coordination: Coordinate the work with all trades that may be affected by the work to avoid conflicts and to allow for an organized and efficient installation of all systems.
- C. Examination and Preparation: Examine installation conditions and verify they are proper and ready for the work to proceed. Verify compatibility of materials in contact with other materials, and suitability for conditions they will be exposed to. Do not proceed with the work until unsatisfactory conditions have been corrected. Prepare area to accept the work and prepare products for the installation.
- D. Field Conditions: Check field conditions and verify all measurements and relationships indicated on the drawings before proceeding with any work. In verifying existing conditions, the Contractor shall verify by direct physical inspection, complete tracing out of systems, by applying test pressures, by excavation and inspection, use of pipeline cameras, and other suitable absolute certain methods to confirm the actual physical conditions that exist.
- E. Openings and Cutting and Patching in New Construction:
 - 1. Openings - General: The General Contractor shall provide all required spaces and provisions in structures of new construction for the installation of work of all other contractors or subcontractors.
 - 2. Coordination: The Contractors doing work subject to Division 20 shall furnish to the General Contractor (in a timely manner) all needed dimensions and locations of openings to allow for these openings to be provided as the construction adjacent to the opening is being done.
 - 3. Cutting and Patching: Cutting and patching of structures in place made necessary to admit work, repair defective work, or by neglect of contractors and subcontractors to properly anticipate their requirements, shall be done by the General Contractor at the expense of the contractors or subcontractors responsible. Work shall be done in a fashion to duplicate the results that would have been obtained had the work been properly sequenced.
 - 4. Patching Materials: Patching shall be with materials of like kind and quality of the adjoining surface by skilled labor experienced in that particular trade.
- F. Openings and Cutting and Patching in Existing Construction:
 - 1. Openings--General: Provide all openings and cutting as needed to accommodate all work. Provide patching to restore all damaged and disturbed areas to pre-construction conditions (or better). The Contractor or subcontractor requiring the opening shall be responsible for making that opening. The opening shall be made by skilled labor experienced in providing openings in the material being penetrated.
 - 2. Areas To Be Cut and Patched: Wherever floors, walls, ceilings, plates, firestops and framing members are cut, these openings shall be substantially reinforced and sealed so as to maintain the strength and sealing ability of the element equal to that as if it had not been cut. All reinforcement/sealing shall satisfy the Architect/Engineer and comply with the governing codes. Such cut areas shall be patched and restored to a finished condition, equal to adjacent final finished areas that have not been cut.

3. Cutting of Structural Features: Make no cuts or alterations to any structural framing members without explicit consent of the Engineer, and then only under his direction. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. All required cutting to install material shall be accomplished with the use of saw cutting equipment.
 4. Patching Materials: Patching shall be with materials of like kind and quality of the adjoining surface by skilled labor experienced in that particular trade.
- G. Cleaning: Clean all products (whether exposed to view or not) of all construction debris, and other materials; grease and oil spots shall be removed with appropriate cleaning agents and surfaces carefully wiped clean. Where cleaning cannot restore items to new conditions, the item shall be replaced with new.

3.02 INSTALLATION

- A. General: Work shall be in accordance with manufacturer's written installation instructions, code, applicable standards, and best construction practices.
- B. Space Verification: Prior to ordering materials verify that adequate space exists to accept the products, along the installation path, and to allow for proper maintenance access. Select products that will fit the space available; some optional materials (i.e. valve types, fitting types, substitutes manufacturer's etc.) may not be suitable. Verification shall be by direct field measurement of the actual space available and use of manufacturer's final submittal dimensions. Where the project involves new construction and long lead items and a time schedule not allowing for such direct field measurements, confirm in writing with all trades associated with building the space that adequate room is available. Review maintenance and service access space required and confirm requirements will be met. No submittals shall be made until such space verification work has been performed, and confirmed that adequate space is available. By virtue of making a submittal that Contractor affirms he has completed this verification.
- C. Installation Locations:
1. General: Unless dimensioned locations for items are shown, select the precise location of the item in accordance with the Contract Documents, coordinated with other trades and item connection locations, and subject to the Architect/Engineer's review. No allowances will be granted for failure to obtain the Architect/Engineer's review, failure to coordinate the work, and failure to comply with Contract Document requirements.
 2. Manually Operated Components: Valves, damper operators, on/off switches, keypads, controls, and other devices which are manually adjustable or operated shall be located so as to be easily accessible by a person standing on the floor adjacent to the item. Any such items which are not in the open shall be made accessible through access doors in the building construction. See individual specification sections for additional requirements.
 3. Monitoring Components: Gauges, thermometers, instrumentation, and other components which display visual information (i.e. operating conditions, alarms, etc.), shall be located and oriented so as to be easily read by a person standing on the floor. Provide necessary brackets, hangers, remote read devices and accessories as needed. Equipment control panels and graphic displays furnished with equipment (or integral to equipment) shall be located to be easily accessible by a person standing on the floor adjacent to the equipment, and be located between 4-feet and 6-feet above the finished floor.
 4. Installation Issues: If circumstances at a particular location make the accessible installation of an item difficult or inconvenient, the situation shall be discussed with the Architect/Engineer before installing the item in a location that will result in poor access.

- 5. ADA Accessibility: Locate items which are required to be ADA accessible in accordance with code (including but not limited to IBC, ICC A117.1 and local amendments) for accessibility; verify accessibility requirements with the AHJ.
- D. Replacement and Maintenance: Install mechanical equipment to permit easy access for normal maintenance, and so that parts requiring periodic replacement or maintenance (e.g. coils, heat exchanger bundles, sheaves, filters, bearings, etc.) can be removed. Relocate items which interfere with access or revise item installation location, orientation, or means of access.
- E. Building Access Doors: Provide access doors where indicated and where needed to provide access to valves, drains, duct access doors, and similar items requiring service or access that would otherwise be inaccessible. Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation. Access doors are typically not shown on the drawings. The Contractor shall review all construction details and types and locations of items requiring access to determine quantity and sizes of access doors required.
- F. Rotating Parts: Belts, pulleys, couplings, projecting setscrews, keys and other rotating parts which may pose a danger to personnel shall be fully enclosed or guarded in accordance with Code, and so as not to present a safety hazard.
- G. Equipment Pads: All ground and slab mounted mechanical equipment shall be installed on a minimum 4-inch thick concrete pad, (unless indicated otherwise).
- H. Dissimilar Metals: Provide separations between all dissimilar metals. Where not specified in another way, use 10 mil plastic tape wrapped at point of contact or plastic centering inserts.
- I. Electrical Offsets: Provide offsets around all electrical panels (and similar electrical equipment) to maintain space clear above and below electrical panels to structure, and clearance of 3.5 feet directly in front of panel, except where indicated otherwise or required by code to be more. Such required offsets are typically not shown on the plans but are to be provided per this paragraph. Include in bid offsets for all systems near electrical panels.
- J. Piping Through Framing: Piping through framing shall be installed in the approximate center of the member. Where located such that nails or screws are likely to damage the pipe, a steel plate at least 1/16-inch thick shall be installed to provide protection. At metal framing, wrap piping to prevent contact of dissimilar metals. At metal and wood framing, provide plastic pipe insulators at piping penetrations through framing nearest each equipment connection and on at least 32-inch centers.
- K. Safety Protection: All ductwork, piping and related items installed by this Contractor that present a safety hazard (i.e., items installed at/near head height, items projecting into maintenance access paths, etc.) shall be covered (at hazardous area) with 3/4" thick elastomeric insulation and reflective red/white self-sticking safety tape. All sharp corners on supports and other installed items shall be ground smooth.
- L. Equipment Access: Access to equipment is of utmost importance. Contractor shall apply extra attention to the location of pipe and duct routings and in coordinating all work so that equipment access and a clear maintenance pathway to equipment is maintained. Poor maintenance access will not be accepted. Contractor shall note that in essentially all areas piping and ducts need to run with slopes parallel to the roof (or floor above), in necessitating elbows/fittings/transitions at crosses of ducts/pipes and at all connections to mains and branches; and requiring added fittings to maintain a clear walking path.

- M. Pressure Tests: Maintain documentation of all pressure (and leakage) tests performed on systems and submit with project closeout documents. Records shall contain (as a minimum): date of test, system name, description portion of system being tested, method of test, initial and final test pressures (or of measured leakage rates, as applicable), indication of test pass or fail, name and signature of individual performing (or documenting) the test, initials of independent witness of test.

3.03 PAINTING

- A. General: Painting shall comply with Division 09 specifications regarding painting. Colors, in all cases, shall be as selected by the Architect/Engineer. Color samples shall be submitted to the Architect/Engineer for approval prior to painting.
- B. The following painting shall be provided under Division 20:
 - 1. All exposed metallic surfaces (includes piping, ducts, hangers, conduits, etc.) provided by this Contractor (except equipment with factory finish or items specifically excluded) shall receive one coat of rust inhibiting primer and two (2) coats of selected finish paint.
 - 2. All exposed insulated surfaces provided by this Contractor (except where specifically excluded) shall receive one coat of primer and two coats of selected finish paint.
 - 3. The inside of all ductwork (including visible dampers, roof vents, insulation pins, and any visible metal) behind grilles, registers, diffusers, and louvers shall be painted flat black.
- C. Items to be painted under Division 09:
 - 1. Exposed duct work in finished areas.
 - 2. Exposed piping in finished areas.

3.04 PENETRATION PROTECTION

- A. Exterior and Watertight Penetrations: Where any work pierces the building exterior (or construction intended to be watertight) the penetration shall be made watertight and weatherproof. Provide all necessary products (e.g. caulking, flashing, screens, gaskets, backing materials, siding, roofing, trim, etc.). Where not detailed or indicated how to install submit shop drawings of the proposed methods. Flashing arrangements shall be per SMACNA Architectural Sheet Metal Manual unless noted otherwise. Caulking alone is not an acceptable means of sealing penetrations.
- B. Equipment: Equipment or products located outdoors shall be watertight (except for provisions designed to intentionally accept water and having drain provisions) and shall be designed and intended by the manufacturer to be used outdoors at the project location. Where any work pierces the unit casing exposed to the outdoors the penetration shall be made watertight and weatherproof; provide all necessary products (e.g. caulking, flashing, gaskets, backing materials, etc.).
- C. Animal Protection: Mechanical system openings, overhangs, shrouds, coverings, gaps below units, and other elements where animals could enter or occupy shall be protected with screens to prevent animal entry or occupation. Screening shall be installed in a neat professional manner, square to the adjacent construction, and be securely attached with removable fasteners.

3.05 START-UP

- A. General: Provide inspections, start-up and operational checks of all mechanical systems and equipment. Maintain documentation of all start-up work and submit with project closeout documents. See individual specification Sections for additional requirements.

- B. Personnel: Inspection and start-up services shall be done by individuals trained in the operation, and knowledgeable with, the systems being started-up. Equipment start-up shall be by the manufacturer's authorized service representative where indicated (see individual specification Sections).
- C. Scheduling and Agenda: Submit a proposed detailed start-up schedule with proposed dates and times at least 30 days prior to the earliest proposed system start-up. Revise dates and times as mutually agreed upon with trades involved, and witnesses, before submitting a final start-up schedule.
- D. Witnessing: Start-up may be witnessed by the Engineer and Owner's representative (at their option). Notify the Engineer and Owner 7 days prior to the proposed start-up time.

3.06 OWNER INSTRUCTION

- A. General: Provide instruction to the Owner on the operation and maintenance of all installed mechanical systems.
- B. Personnel: Instruction on the operation and maintenance of products shall be by individuals trained and experienced in the installation, operation and maintenance of these products. Instruction shall be by the product manufacturer's authorized service representative where indicated (see individual specification Sections).
- C. Scheduling and Agenda: Submit a proposed instruction schedule (with proposed dates and times) and an instruction agenda at least 30 days prior to the earliest proposed instruction period. Coordinate Owner and Architect/Engineer review and arrange mutually agreed upon instruction schedule and the instruction agenda, and submit a final instruction schedule and agenda. Organize instruction by sub-systems corresponding to the project specifications (or similar logical grouping).
- D. Instruction: Demonstrate and explain normal start-up, normal shut-down, normal operation, normal settings, adjustments, signs of abnormal operation, emergency shut-down, safety concerns, and related information. Demonstrate and explain system maintenance requirements with references to the O&M Manual. Show how maintenance is performed, including how items are accessed, maintenance procedures, tools and parts required, and related information. Review typical repairs and explain how performed.

END OF SECTION 20 05 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Protection of Items from Damage.
- B. Maintaining Utilities and Building Services.
- C. Cleaning.
- D. Temporary Systems.
- E. Review of Existing Conditions.
- F. Utility Locate.
- G. Cutting and Patching.
- H. Deactivation and Cap-off of Systems.
- I. Mechanical Demolition and Disposal.
- J. Hazardous Materials Discovery.

1.03 DEFINITIONS

- A. "Remove", "demo", and "demolish" mean "Remove and legally dispose of item and item accessories; except where indicated to be reinstalled, salvaged, or some other required work is indicated."

PART 2 - PRODUCTS

2.01 GENERAL

- A. Materials: All materials used for capping, temporary piping, repairs, reconnecting, reinstalling, and related work shall be same as specified for new systems.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protection: Existing items not being demolished shall be protected against damage. Where necessary to prevent damage or necessary to accomplish other work, items shall be disconnected and moved to a suitable protective storage location during the project and then reinstalled to their original location.

- B. Utilities and Building Systems: Maintain existing utilities and building systems in service (unless indicated otherwise) and protect from damage during project. Where utilities or building systems must be shut-off to accomplish the work, see drawing notes, Section 20 05 00, and Division 01 for downtime limitations and Owner coordination and notification requirements; coordinate interruptions with other trades.
- C. Cleaning: All existing items that remain during construction and were affected by the construction shall be cleaned to a like new condition.
- D. Equipment and System Contents: Equipment and systems contain fluids that are typical for such items (e.g. HVAC units contain refrigerant, oils; hydronic systems contain ethylene glycol, corrosion control chemicals, etc.) and require special removal methods and disposal.
- E. Existing Items:
 - 1. Information and Field Verification: Routing, locations, and identification of existing items on plans are approximate and are limited. The relative location of systems shown on plans has not been verified, and is schematic only. Field verify locations, contents, and flow direction of all piping and ducts prior to performing any work associated with such systems (see also Section 20 05 00). Do not rely on existing labeling of systems; such labeling shall be considered wrong until verified by other physical evidence.
 - 2. Work Around: Existing building cavities (ceiling spaces, walls, etc.) contain a multitude of systems (e.g. conduit, wiring, fire suppression, light fixtures, low voltage system components, piping, ducts, etc.) typical for buildings of the type of this project. Added effort is required to identify and locate these systems, to work around such systems, and to temporarily disconnect and reconnect (and possibly remove and store) various building components to accommodate the work. Existing building elements will also require the work to be installed in smaller sections (i.e. shorter pipe or duct lengths) than normally possible, and to make system connections in awkward or cramped locations.
 - 3. Revisions: Revise existing systems as needed to accommodate project work and new finishes. Work shall include adjusting locations of items to suit new ceiling heights, revisions to building element locations, revisions to finishes, and other changes.
 - 4. Electrical: Verify voltage, phase, horsepower, panel circuits, and other electrical parameters of existing items prior to beginning work and ordering replacement products. Electrical data listed on the drawings for such items has not been field verified.
- F. Cutting: Provide all cutting and openings as necessary to accomplish the work indicated. No structural members shall be cut unless Structural Engineer's approval is obtained first. Assume all building members are "structural" unless clearly evident otherwise. See Section 20 05 00 and Division 01 for additional requirements.
- G. Patching: Patch all wall/floor/ceiling/roof openings left by removal of existing items where wall/floor/ceiling/roof is to remain. Patch with materials and workmanship so as to match finish of adjacent undisturbed area, and to provide conditions equivalent to the original new construction.
- H. Disposal: Dispose of all demolished items and all waste materials off site in accordance with code and legal requirements.
- I. Owner's Salvage: Owner has first right to all items shown to be demolished. All items not wanted by Owner, and not indicated to be salvaged for reuse, shall be removed by the Contractor.

- J. Temporary Systems: Provide temporary services to existing buildings (and areas of buildings) as noted on the plans and as required to allow for continued occupancy during project. Such temporary systems include temporary cold water, hot water, waste, vent, and related systems. Where not specifically indicated, such systems shall be Contractor design/build.

3.02 REVIEW OF EXISTING CONDITIONS

- A. General: Provide field investigation of all systems and existing conditions to confirm extent of demolition, routing of existing systems, existing building materials of construction, mechanical system types and materials involved, areas where cutting and patching is required, site access, sizes of existing system components, and all other aspects of existing building and systems and their relationship to the Work.
- B. Review Timing: Review existing conditions prior to bidding, again prior to commencing any work or ordering materials, and continually throughout the project.
- C. Review for Space and Routing:
 - 1. Review existing conditions (including dimensions) where equipment must be moved through to confirm adequate space and path.
 - 2. Review existing conditions (including dimensions and locations of existing systems) where work will occur to determine impact on the locations and routing of new systems; include time to develop shop drawings and revisions to routing shown on the design drawings to accommodate existing conditions.
- D. Existing Record Drawings: Existing record drawings located at the Owner's facilities office are available for review.
- E. Construction Thickness: Where needed to perform the work, and to prevent damage to adjacent construction, verify the thickness of existing concrete floors and other elements by selective drilling or saw cutting.
- F. Reinforcement Location: Existing concrete floors and walls being cut shall be x-rayed prior to cutting to determine existing reinforcement locations. Reinforcement shall not be cut. Cuts and core drills shall maintain at least 6-inch distance from rebar and other structural elements in concrete (unless noted otherwise).

3.03 EXISTING CONSTRUCTION

- A. Existing Invert Elevations: For bidding purposes, assume that the invert elevation (i.e.) of all underground piping is 6 feet below finish floor (or existing grade for piping outside the building) at work location (unless noted otherwise). Verify depth before beginning work.
- B. Concrete Slabs: All slab on grade concrete floors shall be assumed to be 8" thick, with #4 rebar reinforcement 12" O.C. each way (unless noted otherwise). All upper floors shall be assumed to be 8" thick with #4 rebar 24" O.C. each way (except where existing drawings indicate otherwise).
- C. Ceiling Construction: All ceiling construction shall be assumed to be two layers of 5/8" type X GWB installed over 2 x 6 20 gauge steel stud framing on 16" centers (unless noted otherwise).
- D. Wall Construction: All walls shall be assumed to be constructed of 8 x 16 solid grouted CMU (unless noted otherwise).

3.04 DEMOLITION

- A. General: Review site conditions and identify all demolition work; include in bid all costs for demolition and disposal. Coordinate all demolition work with other trades. Confirm items to be salvaged or reused, and overall demolition scope.
- B. Scope: Not all items to be demolished are necessarily shown on the drawings, but are covered by notes and specifications. In addition to demolishing items indicated, demolish all associated items (unless indicated otherwise); this includes such items as supports, insulation, piping, drains, control wiring/conduit, power wiring/conduit, unions, valves, and similar accessories. Demolish all utilities serving demolished items completely or back to active mains where mains are to remain active; assume such utilities extend at least forty feet from the demolished items (unless indicated otherwise). Demolish all mechanical items located in building elements which are being demolished (i.e. located in walls, chases, roof assemblies, etc.). Demolish items as required to accomplish the work.
- C. Prevent Damage: Where existing building systems are to be reused to serve new items, carefully execute the demolition work to prevent damage to items to be reused and to prevent the demolition of items that are intended for reuse.
- D. Depth: Abandoned items, anchors, inserts, and other projections embedded in existing construction and not being concealed by new construction shall be removed to 1" below the adjacent finished surface, and the disturbed area patched.
- E. Cap-Offs and Terminations:
 - 1. Permanent: Provide cap-off of all existing utilities and systems that are cut or served demolished items. All cap-offs shall occur in concealed locations (unless indicated otherwise). Cap-off's shall be of equivalent material as the item being capped and be insulated where the connected system was insulated or where doing so will reduce energy consumption or prevent condensation.
 - 2. Temporary: Provide temporary cap-off of all existing utilities and systems to allow continued use of all systems until the final system components are installed and connected.
 - 3. Wiring Terminations: Terminate all control wiring and electrical power connections in a manner that complies with code and allows remaining items to function as intended.

3.05 ALLOWANCE FOR EXISTING CONSTRUCTION

- A. Piping: Assume 60 total linear feet of 1-inch insulated copper HW/CW piping needs to be removed and repiped with a 5 foot offset.
- B. Ductwork: Assume 3 each 16 x 16 ducts need to be removed and offset to a location 5 feet away.

3.06 REMOVAL AND REINSTALLATION

- A. General: Where items are required to be removed to allow for other work and then be re-installed when the other work is done, comply with the following.
- B. Removal: Carefully remove items to prevent damage and in a manner to allow for reinstallation. Remove all related items to the extent needed to allow for the Work.
- C. Package: Package item to allow for transport and storage without damaging. Label packaging to identify contents; include unique identifier number, brief description, and location (room number) item was removed from.

- D. Documentation: Compile list of removed items and documentation needed to allow for their reinstallation.
- E. Storage: Store items in secure and protective area until ready for reinstallation.
- F. Reinstallation:
 - 1. Reinstall items and accessories as completion of other work allows. Provide all necessary connections and services to allow item to function properly; not all such connections are illustrated on the plans.
 - 2. Provide new fasteners, supports, anchors, gasketing, seals, pipe connectors, unions and related items to allow for complete and proper connections and operation of reinstalled items.

3.07 HAZARDOUS MATERIALS

- A. Hazardous Materials Discovery: If materials containing hazardous materials (other than those indicated) are discovered, do not disturb. Notify Owner to allow review and determine resolution. Assume in bidding and scheduling that there will be two occurrences of finding such materials, causing a 5 day project work stoppage each occurrence.

END OF SECTION 20 05 03

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Strainers.
- B. Unions.
- C. Flexible Connectors.
- D. Access Doors.

1.03 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product information data for all items to be used.

1.04 REFERENCES

- A. ANSI Z21.24: Connectors for Gas Appliances.
- B. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B16.39: Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300.
- D. IFGC: International Fuel Gas Code.
- E. IMC: International Mechanical Code.
- F. UPC: Uniform Plumbing Code.

1.05 GENERAL REQUIREMENTS

- A. Domestic (Potable) Water Systems: All items in contact with potable water shall be lead free in accordance with ANSI/NSF 61. Plastic piping system components shall comply with ANSI/NSF 14.
- B. System Requirements: Products shall comply with additional requirements cited for the specific systems the products are being installed in; see specific system specification sections.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Strainers: Watts, Keckley, Mueller, Sarco, Taco, Paco, Bell & Gossett, Armstrong, Wilkins.
- C. Unions: Anvil, Nibco, Watts, Epco, Victaulic, Ward, Jefferson Union.
- D. Dielectric Connectors: Victaulic Precision Plumbing Products, Elster Perfection.
- E. Flexible Connectors: Universal, Mason, Dormont, OPW, Unisource, Twin City Hose.

- F. Access Doors: J.R. Smith, Zurn, Josam, Acudor, Elmdoor, Kees, J.C. Industries.
- G. Escutcheons: Selected by Contractor.

2.02 STRAINERS

A. Water Systems:

1. Copper Piping Systems 2-1/2" and Smaller: Bronze body, "Y" type, screwed or solder type end connections, 125 lb class (rated 125 psi steam working pressure at 350 deg F minimum) and 400 psi (WOG) rated working pressures at 210 deg F, stainless steel 20 mesh wire screen, and gasketed retainer cap. Reinforce wire mesh with perforated stainless steel sheet for sizes 2" and 2-1/2". Ratio of net free area of screen to pipe free area greater than 3.5. Provide with blowdown valve, ball type, with 3/4" NPT male end connection. Valve manufacturer shall be listed as an "Acceptable Manufacturer" in the hydronic piping system specification section.
2. Copper Piping Systems 3" and Larger: Bronze or ductile iron body, "Y" type, flanged end connections, 150 lb class (rated 150 psi steam working pressure at 400 deg F minimum), brass or stainless steel screen with 3/64" perforations for 3" and 3/32" perforations for larger sizes; with gasketed threaded retainer cap. Ratio of net free area of screen to pipe free area greater than 3. Provide with blowdown valve, ball type, with 3/4" NPT male end connection. Valve manufacturer shall be listed as an "Acceptable Manufacturer" in the hydronic piping specification section.
3. Steel Piping Systems: Ductile iron, cast iron, or carbon steel construction, "Y" type, 250 lb class (rated 250 psi steam working pressure at 450°F minimum), with stainless steel screen. Screen shall be 20 mesh for strainers up to 2" in size, and have 3/32" perforations on larger sizes. Sizes 2-1/2 inch and less shall have threaded end connections; larger sizes shall have flanged end connections. Provide with bolted and gasketed strainer cap on flanged strainers; provide threaded gasketed retainer cap on threaded strainers. Provide with blowdown valve, ball type, with 3/4" NPT male end connection. Valve manufacturer shall be listed as an "Acceptable Manufacturer" in the hydronic piping system specification section.

2.03 UNIONS

- A. Dielectric Unions: Shall not be used. Provide "dielectric connector" with standard union where union is required at connection point of dissimilar materials.
- B. Unions on Copper Pipe:
 1. General: Pressure and temperature ratings to match (or exceed) piping system being installed in; minimum Class 125.
 2. 2-Inch Pipe and Smaller: Wrought copper solder joint copper to copper union, complying with ASTM B16.18.
 3. 2-1/2-Inch Pipe and Larger: Brass flange unions.
- C. Unions on Steel Pipe:
 1. General: Pressure and temperature ratings to match (or exceed) piping system being installed in; minimum Class 150.
 2. Threaded: Malleable iron union, threaded connections, with ground joints, complying with ASME B16.39. Provide with brass-to-iron seat (except provide iron-to-iron seat where the conveyed material is detrimental to brass).
 3. Welded and Flanged: Flange unions; see individual system specification sections.

- D. Dielectric Connector: Schedule 40 steel pipe nipple, zinc electroplated, with internal thermoplastic lining which is NSF/FDA listed and meeting all code requirements for potable water applications. Suitable for continuous use up to 225 deg F and 300 psi. "Clearflow" dielectric waterway (or approved). For systems operating at temperatures greater than 225 deg F provide flanged connections with insulating gaskets.

2.04 FLEXIBLE CONNECTORS

- A. Pump Flexible Connectors: Twin sphere type, constructed of peroxide cured EPDM with Kevlar tie cords, multilayered. Embedded solid steel rings shall be used at raised face flanged ends. Shall have an external ductile iron reinforcement ring between spheres. Rated minimum 225 psi at 230°F. Control rods shall be used as recommended by the manufacturer for the application; rods shall have 1/2-inch thick neoprene bushings, washers and accessories sized to accommodate system loads and conditions. Same size as pipe installed end, with end connections to suit connecting piping. Mason Industries "SafeFlex" SFDEJ Series, and SFDCR Series.
- B. Piping Flexible Connectors:
 - 1. General Use: Corrugated hose type with outer braided wire sheath covering. Corrugations shall be close pitch annular type. Minimum working pressure of 250 psig, minimum length of 12 inches (or 12 times the connector's nominal diameter, whichever is more), and screwed or flanged end connections. Metal for hose shall be bronze or stainless steel; braided sheath shall be stainless steel, any type of ASTM 300 series.
 - 2. Fuel Gas Piping 1-1/4 inch and Smaller: Factory fabricated flexible gas connector, constructed of type 304 stainless steel tubing, corrugated, with brass or stainless steel threaded end fittings, and heavy PVC coating. Listed for use in fuel gas piping systems; complying with ANSI Z21.24 and IFGC. Size flexible connector to match pipe size shown on plan, with reducer after the flexible connector to match the equipment connection size (where connecting to equipment). Length as required to accommodate equipment movement relative to piping; minimum 18-inch length for sizes 1/2-inch diameter and less; minimum 24-inch length for larger sizes. Where used on appliances that require to be moved for cleaning or servicing, provide type listed for mobile appliance application, with adequate length to allow for appliance movement, and with a restraining cable and mounting hardware to prevent strain applied to gas connector.
 - 3. Fuel Gas Piping Larger than 1-1/4 inch: Factory fabricated flexible gas piping connector, constructed of series 304 or 321 stainless steel, with braided exterior, carbon steel (or stainless steel) threaded or flanged end connections, rated for 350 psig working pressure, For use with fuel gas piping systems and complying with IFGC. Size flexible connectors to match pipe size shown on plan, with reducer after the flexible connector to match the equipment connection size.

2.05 ACCESS DOORS

- A. Hinged lockable steel access door, for mounting on face of wall, with minimum 16 gauge frame and 16 gauge door, concealed hinge, cam and cylinder lock, and anchor straps or anchor frame with mounting holes. Provide Type 304 stainless steel construction with No. 4 finish where used in restrooms, locker rooms, kitchens, and similar "wet" areas. Provide steel construction with prime coated finish in other areas. Door shall have rounded corners, and concealed pivoting rod hinge. Size shall be 12" x 12" (unless indicated otherwise on plans) but shall be large enough to allow necessary access to item being served and sized to allow removal of the item (where access door is the only means of removal without disturbing fixed construction).

- B. Fire Rating: Door shall maintain fire rating of element installed in; reference drawings for required rating.
- C. Access doors shall all be keyed alike. Provide two (2) keys for each door.

2.06 ESCUTCHEONS

- A. Type: Circular metal collar to seal pipe penetrations at building elements (i.e. walls, floors, cabinets, and ceilings); one piece type except that split hinge type may be used for applications on existing piping.
- B. Construction: Constructed of chrome plated brass or polished stainless steel, sized to tightly fit pipe exterior surface (or pipe insulation where insulated) and to fully cover the building element penetration.
- C. Projection: Shallow face type with maximum projection from wall not to exceed 1.2 times inner diameter of escutcheon.
- D. Special Applications: For sprinkler heads and similar special applications see items' specification Section.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Strainers: Install strainers ahead of each control valve, and ahead of each steam trap, and as indicated. Provide valve in blow-off connection on strainers, valve shall be same size as blow-off tapping.
- B. Unions: Install unions in pipe connections to control valves, coils, regulators, reducers, all equipment, and where it may be necessary to disconnect the equipment or piping for repairs or maintenance; and as indicated. Where flanged connections occur at equipment additional unions are not required unless indicated otherwise. Dielectric unions shall not be used.
- C. Dielectric Connectors: Install connectors between all connections of copper and steel piping (or equipment), and other dissimilar metals. Where flanged connections occur use insulating type flanges. Dielectric unions shall no be used.
- D. Flexible Connectors - Pumps: Install at all suction and discharge connections (except not required on pumps 1 HP and less).
- E. Flexible Connectors - Piping: Install at pipe connections to equipment with rotating elements (except not required at hydronic heating/cooling coils unless specifically noted), at building expansion joints, and where indicated. Provide flexible connector in gas piping connections to all equipment; size flexible connectors to match pipe size shown on plan, with reducer after the flexible connector to match the equipment connection size.
- F. Access Doors: Provide access doors where indicated on the drawings and where needed to provide access to trap primers, water hammer arresters, cleanouts, valves, coils, controls, mechanical spaces, and similar items requiring service or access that would otherwise be inaccessible. Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation. Access doors are typically not shown in the plans. Review ceiling and wall types and locations of items requiring access to determine quantity and sizes of access doors required.

- G. Escutcheons: Provide at all pipe penetrations through building elements, except where penetration is concealed (unless specifically noted otherwise). Items located in accessible cabinet spaces (e.g. below sinks) are not considered concealed.

END OF SECTION 20 05 19

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Pipe Hangers and Supports.
- B. Duct Hangers and Supports.
- C. Mechanical Equipment Anchors and Supports.

1.03 QUALITY ASSURANCE

- A. Pipe Hanger Standards: Manufacturers Standardization Society (MSS) Standards SP-58, SP-89, SP-69, and SP-90.
- B. General: All methods, materials and workmanship shall comply with Code; including IBC, IMC, UPC, NFPA Standards, and ASME standards.

1.04 SUBMITTALS

- A. General: Submittals shall comply with Section 20 05 00.
- B. Product Data: Submit product data for all hangers, supports, and anchors. Data to include finish, load rating, dimensions, and applicable agency listings. Indicate application for all items by system type, size, and other criteria as appropriate to project.
- C. Shop Drawings:
 - 1. General: Shop drawings shall clearly indicate dimensions, anchor and support type, anchor and support size, anchor and support spacing, finish, configuration, and systems/equipment to be applied to.
 - 2. Attachments: Submit shop drawings for proposed attachment methods to building structure where the method of attachment has not been shown on the drawings, or where attachment methods other than those shown on the drawings are desired to be used.
 - 3. Fabricated Supports: Submit shop drawings for all fabricated supports.
 - 4. Finished Areas: Submit shop drawings for all supports that will be exposed in finished areas.

1.05 GENERAL REQUIREMENTS

- A. Seismic: Provide adequate hangers, supports, anchors, and bracing to serve as seismic restraints. Seismic anchoring and bracing methods shall comply with SMACNA SRM, Mason SRG, and code. Seismic restraints system shall be able to withstand seismic forces as required by code; provide seismic restraint calculations as required by the AHJ.
- B. Design and Manufacture: All pipe hangers and supports shall be designed and manufactured in accordance with MSS-SP 58.

1.06 REFERENCES

- A. ADC: Air Duct Council - Flexible Duct Performance and Installation Standard, 5th Edition.

- B. ASHRAE-F: American Society of Heating, Refrigeration, and Air Conditioning Engineers, Handbook of Fundamentals.
- C. ASME B31.1: Power Piping.
- D. ASME B31.9: Building Services Piping.
- E. ASTM A36: Standard Specification for Carbon Structural Steel.
- F. ASTM A108: Standard Specification for Steel Bar, Carbon and Alloy, Cold - Finished.
- G. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- H. ASTM A153: Standard specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- I. ASTM A653: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- J. ASTM A907: Standard Specification for Steel, Wire, Epoxy - Coated.
- K. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process.
- L. IBC: International Building Code.
- M. IMC: International Mechanical Code.
- N. Federal Spec QQ-W-461H: Wire, Steel, Carbon (Round, Bare, and Coated).
- O. Mason SRG: Mason Industries Seismic Restraint Guidelines for Suspended Piping, Ductwork, Electrical Systems and Floor Mounted Equipment, 6th Edition.
- P. MSS SP-58: Pipe and Hangers and Supports - Materials, Design and Manufacture.
- Q. MSS SP-69: Pipe and Hangers and Supports - Selection and Application.
- R. MSS SP-89: Pipe Hangers and Supports - Fabrication and Installation Practices.
- S. MSS SP-90: Guidelines on Terminology for Pipe Hangers and Supports.
- T. SMACNA-DCS: HVAC Duct Construction Standards, 3rd Edition.
- U. SMACNA SRM: Seismic Restraint Manual Guidelines for Mechanical Systems, 2nd Edition.
- V. UPC: Uniform Plumbing Code.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Hangers and Supports: Grinnell, B-Line Systems, Unistrut, Erico, PHD, Basic-PSA, Pate, Caddy, Unisource, Metraflex, American Insulation Sales, Thermal Pipe Shields, Miro Industries.
- C. Anchors: Rawplug, Phillips, Hilti, Michigan, Simpson, Fastenal, Grinnell, B-Line Systems, Unistrut, PHD, Basic-PSA, Metraflex.

2.02 GENERAL

A. Finish:

1. Indoor Applications: Electro-plated zinc in accordance with ASTM B 633, or hot-dip galvanized after fabrication in accordance with ASTM A 123; except that hanger straps may be formed from pre-galvanized steel.
2. Outdoor Applications: Hot-dip galvanized after fabrication in accordance with ASTM A 123, ASTM A 153, or ASTM A 653 (as applicable to item).

B. Identification: Steel pipe hangers and supports shall be stamped with the manufacturer's name, part number, and size.

C. Hanger Rods: Threaded hot rolled steel. Hanger rods shall be sized so that the total load imposed (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:

| <u>Nominal Rod Diameter</u> | <u>Maximum Load</u> |
|-----------------------------|---------------------|
| 1/4 Inch | 240 Pounds |
| 5/16 Inch | 440 Pounds |
| 3/8 Inch | 610 Pounds |
| 1/2 Inch | 1130 Pounds |
| 5/8 Inch | 1810 Pounds |
| 3/4 Inch | 2710 Pounds |
| 7/8 Inch | 3770 Pounds |
| 1 Inch | 4960 Pounds |

D. Hanger Straps: Galvanized steel, minimum 1" x 22 gauge (except where required by Code to be heavier or noted otherwise), of lock-forming grade conforming to ASTM A924, G90 (minimum) galvanized coating conforming to ASTM A 653. Minimum yield strength of 30,000 psi. Straps shall be sized so that the total load imposed does not exceed the following:

| <u>Strap Size</u> | <u>Maximum Load</u> |
|-------------------|---------------------|
| 1" x 22 Gauge | 230 Pounds |
| 1" x 20 Gauge | 290 Pounds |
| 1" x 18 Gauge | 380 Pounds |
| 1" x 16 Gauge | 630 Pounds |
| 1-1/2" x 16 Gauge | 990 Pounds |

E. Beam Attachments: Constructed of malleable iron or steel, MSS standard types designed for clamping to building structural support beam. "C" clamp type shall have cup point set screws with locknuts and retaining straps. Center loaded type beam clamps shall have horizontally adjustable clamping bolt (or rod with nuts).

F. Concrete Anchors: Wedge type expansion anchors, with hex nut and washer, and stainless steel split expansion rings. Tested to ASTM E 488 criteria, UL listed, with exposed anchor head stamped with code to identify anchor length.

G. General Anchors (Screws, Nuts, Bolts, Fasteners):

1. General: Constructed of materials suitable for the conditions exposed to and materials being joined, with minimum 50 year service life. Stainless steel construction where exposed to corrosive conditions. Configuration, size and grade to suit application, accommodate expected forces, and provide anchoring to structural element (or allow for proper fastening of items). Minimum safety factor of 2.5 (or as required by code, whichever is greater). Comply with ASTM A307, SAE J429, SAE J78, or ASTM A 563; bolts and nuts shall have unified inch screw threads (course, UNC).
2. Test Reports: Provide independent test report indicating fastener strength (pullout and shear) as installed in the materials and applications of this project (when required by the Engineer or AHJ).
3. Finish: In finished areas, the portion of fastener exposed to view shall match the exposed finish of item being fastened.

H. Manufactured Strut Systems:

1. Channels: Minimum 12 gauge, 1-5/8 x 1-5/8" (unless noted otherwise), with slots/holes to suit application.
2. Accessories: Channel nuts press formed, machined and hardened with gripping slot, fabricated from steel conforming to ASTM A 108 or ASTM A 36. Fittings fabricated from steel in accordance with ASTM A 907.
3. End Caps: Vinyl cap, capable of withstanding high temperatures without degradation, manufactured specifically for use with manufactured strut. Unistrut Series P2859 or P2860 (or approved).

I. Steel: Structural steel per ASTM A 36.

J. Wood: Only allowed to be used where building structural elements are of wood construction same type, grade used for building structural members. Where located outdoors shall be the pressure treated type; with all cut portions of wood painted with wood preservative.

K. Field Galvanizing Compound: Brush or spray applied galvanizing treatment; consisting of a premixed ready to apply liquid organic zinc compound, with 95% metallic zinc content by weight in dry film. ZRC worldwide "ZRC Cold Galvanizing Compound".

2.03 PIPE HANGERS AND SUPPORTS

- A. Copper Pipe: All hangers used directly on copper pipe shall be copper plated or have a factory applied 1/16-inch thick (minimum) plastic coating on all contact surfaces.
- B. Cushion Clamps: Pipe clamps with a vibration dampening insert between the pipe and clamp, with a nylon inserted lock-nut on clamp. Insert shall be constructed of a thermoplastic elastomer, designed to tightly fit and match pipe size and clamp used with; suitable for system temperatures.
- C. Type: Shall be MSS type selected in accordance with MSS-69; except that MSS type 24, 26, and 34 shall not be used.

- D. Trapeze Hangers: Shall be constructed of carbon steel angles, manufactured strut channels, or other structural shapes with flat surface (or installed saddle) for pipe support. Provide steel washer where hanger rod nuts bear on trapeze hanger. Pipe anchors shall be two piece clamp type designed for use with trapeze style (i.e. inserted into strut channel opening) or one piece type designed for welded or bolted attachment to trapeze; shaped to match pipe size (or pipe size plus insulation thickness on insulated systems). Pipe guides shall comply with paragraph titled "Alignment Guides"; or be steel angles with vertical leg height equal to pipe diameter (or pipe diameter plus insulation thickness on insulated systems); or be two piece clamp type pipe anchors sized and installed to serve as a guide.
- E. Insulated Pipe Supports:
1. Insulation material at pipe support shall consist of expanded perlite, calcium silicate or high density phenolic. Where located outdoors or used on chilled water piping, insulation material, shall be water resistant. Insert shall have a flame resistant jacket of nylon reinforced kraft paper bonded to aluminum foil cover on insulation, with galvanized steel shield. Insulation material shall have no more than 5% deformation at 100 psi and a thermal conductivity no more than 0.32 Btu/hr-sf-deg F-inch (rated at 75 deg F). Insulation shall be suitable for temperatures and conditions it will be exposed to without degradation over a 30 year life.
 2. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E84.
 3. Insert shall be same thickness as adjoining pipe insulation, sized to match pipe diameter used on.
 4. Minimum insulation and shield lengths, and minimum shield gauge:

| Nominal Pipe Diameter <u>In Inches</u> | Insulation Length <u>In Inches</u> | Shield Length <u>In Inches</u> | Minimum** Shield <u>Gauge</u> |
|---|---------------------------------------|-----------------------------------|-------------------------------------|
| 1/2 to 1 | * | 4 | 20 |
| 1-1/4 to 2 | 6 | 4 | 20 |
| 2-1/2 to 6 | 6 | 4 | 18 |
| Larger Sizes | 9 | 6 | 16 |

* Insert not required; shield at insulation is acceptable.

** Provide with 360° shield where pipe is clamped (or has a 360° anchor).

2.04 DUCT HANGERS AND SUPPORTS

- A. Hangers: As shown in SMACNA-DCS except that wire shall not be used and all materials used shall comply with these specifications.
- B. Vertical Duct Supports at Floor: 1-1/2" x 1-1/2" x 1/8" (minimum) galvanized steel angle and to support ducts, maximum 12 foot on center, and as shown in SMACNA-DCS. For ducts over 30 inches wide provide riser reinforcing with hanger rods between the riser support and riser reinforcing.
- C. Vertical Duct Supports at Wall: 1-1/2" x 1/8" (minimum) strap or 1-1/2" x 1-1/2" x 1/8" (minimum) angle bracket and as shown in SMACNA-DCS.
- D. Hanger Attachments to Structure: As shown in SMACNA-DCS to suit building construction and as allowed on structural drawings. Provide washers at all fasteners through hanger straps (regardless of SMACNA-DCS allowances). Where C-clamps are provided, retainer clips shall be used. Friction beam clamps shall not be used.

- E. Hanger Attachments to Ducts: As shown in SMACNA-DCS except that wire shall not be used as any form of support or attachment for ducts.
- F. Flexible Duct Strap: Woven polypropylene hanging strap, minimum tensile strength of 400 lbs, minimum 1.75-inches wide, designed and intended for flexible duct support.
- G. HVAC Support Wire: Steel, minimum 12 gauge, soft-annealed wire, complying with Federal Specification QQ-W-461H, and IBC for support of ceilings and accessories installed in ceilings.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. General: Provide all necessary bolts, nuts, washers, fasteners, turnbuckles, hanger rods, rod connectors, stanchions, wall/roof/floor backing and attachments, bridging between structural members, and any other miscellaneous accessories required for the support and anchoring of all pipes, ducts, and mechanical equipment. All supports, whether from floor, walls, or hung from structure, are Contractor's responsibility. Anchors and supports shall be adequate to accommodate forces equipment will be exposed to. Any field cut pieces of galvanized materials shall be hot-dip galvanized after cutting; or be solvent and wire brushed clean and receive field applied galvanizing treatment. This field applied galvanizing (only allowed with prior permission for minor localized cuts) shall use multiple coats to provide as near equal protection as possible to factory (or hot-dip) applied coatings.
- B. Backing: Install steel or wood backing in walls (anchored to studs) and in ceiling (anchored to joists or trusses), as required to provide support for items.
- C. Installation: Install all inserts, anchors, and supports in accordance with manufacturer's instructions, code requirements, and best professional practices. The most restrictive criteria governs.
- D. Welded Assembly Finish: All welded steel support assemblies shall have a power wire brush and primer paint finish where installed indoors and be have factory applied hot-dip galvanized finish where installed outdoors (or subject to moisture); unless another finish is specified.
- E. Attachments: Attach to anchoring element (i.e. building structure, concrete pads, etc.) as shown on drawings (reference structural drawings). Where not detailed on the drawings, the Contractor shall design and submit shop drawings of proposed attachment methods to the Engineer for review.
- F. Application:
 - 1. Where not detailed on the drawings (or otherwise indicated), the selection and design of supports is the Contractor's responsibility, in compliance with code and Contract Document requirements; subject to submittal review and acceptance by the Engineer.
 - 2. Exposed supports in finished areas shall be arranged to minimize their visibility; be free of dents, scratches and labels, and be configured in a manner to match the decorum and finish of the room they are installed in. Exposed supports in finished areas shall be cleaned to allow for field painting (unless a chrome, stainless steel, or similar finish has been indicated).
 - 3. HVAC Support wire and flexible duct strap shall only be used for support of ceiling air inlets and outlets, or at flexible duct supports.
- G. Manufactured Strut ("Unistrut"): Provide end caps on all strut ends at the following locations:
 - 1. Where exposed to view in finished areas.
 - 2. Where near maintenance access paths.
 - 3. Where personnel injury could occur if the ends were not covered.

- H. Seismic: Provide hangers, supports, anchors and bracing as required by code and as necessary to accommodate forces in a seismic event. Seismic bracing is not required for piping sized 2-inch and less, or for horizontal piping where the distance from the top of the pipe to the support attachment point to the building structure is less than 12-inches (unless noted otherwise). Seismic bracing is not required for ductwork less than 28-inch in diameter or having across sectional area less than 6 square feet, or for horizontal ductwork where the distance from the top of the duct to the support attachment point to the building structure is less than 12-inches (unless noted otherwise). All equipment shall be seismically anchored.

3.02 INSTALLATION OF PIPE HANGERS AND SUPPORTS

- A. General: Aboveground pipe shall be anchored to the structure to prevent sagging, to keep pipe in alignment, and to resist the forces the pipe will be exposed to; piping shall be supported independent of equipment so that no loads bear on the equipment.
- B. Adjustment: All pipe supports shall be provided with a means of adjustment for the aligning and leveling of the pipe after installation.
- C. Applications: Selection, sizing, and installation of pipe supports and accessories shall be in accordance with the manufacturers recommendations, standards MSS SP-89 and MSS SP-69, UPC, and IMC. Refrigerant piping and similar piping subject to vibration (i.e. high pressure tubing) shall be installed with cushion clamps.
- D. Support Spacing: Provide piping support spacing according to the most restrictive of the following: UPC, IMC, ASME B31.1, B31.9, local codes, manufacturers recommendations or Contract Documents specific requirements. Provide supports at each change in direction of piping and at each side of concentrated loads (such as in-line pumps, valves greater than size 5", and similar items). On hubless cast iron piping provide supports at each branch connection; and hubless cast iron piping greater than size 2" shall have supports on both side of piping couplings.
- E. Trapeze Hangers: Four or more pipes running parallel may be supported on trapeze hangers provided the slopes of such pipes allow use of common trapeze. Suspend trapeze hanger from the building structure using hanger rods; attach to the building structure using concrete inserts, beam clamps, or other approved methods. Where trapeze width exceeds 30 inches, and where building attachment restrictions require more anchor points, provide three (or more) hanger rod supports. Provide pipe anchors to secure piping to trapeze on minimum 20 foot spacing; size and install pipe anchor to allow longitudinal movement of pipe (unless noted otherwise) with minimal vertical and transverse movement; where pipe is subject to expansion/contraction provide anchoring and alignment guides per paragraph titled "Thermal Expansion/Contraction".
- F. Vertical Piping Supports: Support piping at each floor line with pipe clamps and at intermediate points as required so that hanger spacing does not exceed allowable spacing and as required to prevent excessive pipe movement and so as to comply with the maximum spacings cited above. Support all pipe stacks at their bases with a concrete pier or suitable support. For vertical pipe drops which occur away from a wall or similar anchoring surface, provide angled bracing from nearest structure on two sides of drop to provide rigid anchoring of pipe drop. Provide riser clamps and vertical supports on all vertical vent piping where the vertical pipe length exceeds 5'.
- G. Pre-Insulated Pipe Supports: Protect all insulated pipe at point of support with pre-insulated pipe supports. Such supports shall be in place at time of installing pipe.
- H. Underground Pipe: Shall be evenly supported on approved bedding materials, as appropriate for the type of piping being used. Such bedding and backfilling shall be as specified in Section 20 05 90.

3.03 INSTALLATION OF DUCT HANGERS AND SUPPORTS

- A. General: Provide anchors and supports for all ductwork. Supports and hangers shall comply with SMACNA-DCS, except that hanger spacing and hanger maximum loads shall be governed by whichever is more restrictive between these specifications or SMACNA-DCS.
- B. Hanger Spacing -- Rectangular Duct:
- | <u>Duct Area</u> | <u>Maximum Spacing</u> |
|-----------------------|------------------------|
| Up to 4 Square Feet | 8 Feet |
| 4.1 to 10 Square Feet | 6 Feet |
| 10 Square Feet and Up | 4 Feet |
- C. Hanger Spacing -- Round Duct:
- | <u>Duct Area</u> | <u>Maximum Spacing</u> |
|-----------------------------|------------------------|
| Up to 24 Inch Diameter | 8 Feet |
| 25 Inch to 48 Inch Diameter | 6 Feet |
| 49 Inch Diameter and Up | 4 Feet |
- D. Hanger Spacing - Flexible Duct: 4 feet, and at changes of direction as needed to maintain duct elevation and smooth airflow.
- E. Vertical Ducts: Support at each floor level, but in no case less than on 12 foot intervals.
- F. Flexible Duct: Support with methods shown in ADC. Metal strap in contact with the flexible duct shall have minimum 1.5-inch width.
- G. Fittings: Provide supports at each change in direction of duct for ducts with 4 square foot area or more, or for ducts larger than 24 inch diameter. Locate hangers at inside and outside corners of elbows--or at each end of fitting on each side.
- H. Concentrated Loads: Provide additional supports at each side concentrated loads such as modulating dampers (24" x 24" and larger), duct heaters (18" x 18" and larger), sound attenuators (all sizes), and similar items.
- I. End of Duct: At end of duct run, hangar shall be located no more than 1/2 the allowed hangar spacing from the end of the run.

3.04 CEILING SERVICES

- A. Less than 20 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners (or ceiling support members) or to cross runners with the same carrying capacity as the main runners (or support members).
- B. 20 to 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing 20 pounds but not more than 56 pounds, in addition to the above, shall have two No. 12 gauge wire hangers (or minimum 1" x 22 gauge hangar straps) connected from the terminal or service to the ceiling system hangers or to the structure above. These added hangers may be slack.
- C. Greater Than 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing more than 56 pounds shall be supported directly from the building structure by approved hangers.

3.05 MECHANICAL EQUIPMENT ANCHORS AND SUPPORTS

- A. General: Provide anchoring and supports for all mechanical equipment. All equipment shall be anchored to (or supported from) the building structure. In lieu of anchoring to the building, anchor outdoor equipment to the concrete pad serving the equipment.

- B. Suspended Equipment: Support as indicated on the plans. Where not indicated use the methods shown (or consistent with) Mason SRG and SMACNA-DCS; submit shop drawings of the proposed methods to the Engineer for review.
- C. Vibration Isolation: Equipment shall be supported and anchored in such a way so that no equipment vibration is transmitted to the building structure.
- D. Seismic: Provide anchors and bracing to resist seismic forces.

END OF SECTION 20 05 29

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Pipe Sleeves.
- B. Firestop Seals.
- C. Non-Firestop Seals.

1.03 DEFINITIONS

- A. Firestop System: Specific firestop materials or combination of materials installed in a specific way in openings in a specific rated assembly to restore (or maintain) the fire rating and smoke passage resistance properties of the assembly.
- B. Firestop Seal: Same as "Firestop System".
- C. Rated Assembly: Wall, floor, roof, ceiling, roof/ceiling or other construction which is required (by code or the Contract Documents) to have a fire-resistance rating, be a smoke barrier, or to limit the passage of smoke.

1.04 SUBMITTALS

- A. General: Shall comply with Section 20 05 00.
- B. Product Data: Provide product data on all material to be use. Provide MSDS for all sealants, caulks and similar materials.
- C. Shop Drawings – General: Shop drawings of proposed sealing/flashing assembly for roof and exterior wall penetrations.
- D. Shop Drawings – Firestop: Provide firestop system shop drawings showing:
 - 1. Listing agency's detailed drawing showing opening, penetrating items, and firestop materials. Drawing shall be identified with listing agency's name and number or designation, fire rating achieved, and date of listing for each firestop system.
 - 2. Identify where each firestop system is to be used on the project.
 - 3. Manufacturer's installation instructions.
 - 4. For proposed systems that do not conform strictly to the listing, submit listing agency's drawing marked to show modifications and stamped approval by the firestop system manufacturer's fire protection engineer.
 - 5. Other data as required by the AHJ.

1.05 REFERENCES

- A. ASTM A 36: Standard Specification for Carbon Structural Steel.
- B. ASTM C534: Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- C. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

- D. ASTM E 814: Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- E. UL 1479: Standard for Fire Tests of Through-Penetration Firestops.
- F. UL 723: Surface Burning Characteristics of Building Materials.
- G. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.
- H. SMACNA-ARCH: SMACNA Architectural Sheet Metal Manual, 7th Edition.

1.06 GENERAL REQUIREMENTS

- A. Corrosion Protection: All sleeves exposed to water, moisture, chemicals, or subject to corrosion shall be constructed of corrosion resistant materials suitable for the exposure. Steel sleeves shall be hot dip galvanized after assembly. Provide additional coatings as noted or as required to resist corrosion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Firestop Seal Materials: 3M, Dow Corning.
- C. Non-Firestop Seal Materials: 3M, GE, Dow Corning, Tremco, Pecora, Sonneborn, Pipeline Seal & Insulator.

2.02 PIPE SLEEVES

- A. Diameter:
 - 1. Belowground: Inside diameter of belowground pipe sleeves shall be at least 2 inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), so as to allow free movement of piping.
 - 2. Aboveground: Inside diameter of aboveground pipe sleeves shall be at least 1-inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), so as to allow free movement of piping.
 - 3. Large Movement: Provide larger sleeves where a larger space around pipe exterior is required by code, where specifically noted, where pipe movement will occur (i.e. expansion/contraction or seismic), at expansive soils, other unusual conditions are present, and where required to accommodate large piping movement.
- B. Length: Horizontal sleeves through finished areas (where sleeve is exposed to view) shall be sized to be flush with finished surfaces; other horizontal sleeves may terminate flush to 2-inches past the element being penetrated. Vertical sleeves shall be sized to extend one inch above the final floor elevation.
- C. Structural Type: Fabricated from schedule 40 steel pipe. Waterstop shall consist of fully welded 2-inch larger diameter collar, minimum 1/4 inch thick steel, located on sleeve so as to be centered within the element being penetrated. Provide waterstop on sleeves where sleeves are installed in the following locations: in cast-in-place concrete, where any part of the sleeve ends are exposed to water, where installed in floors with water-proofing or water stopping membranes, in rooms with floor drains, and where needed for anchoring/support purposes. Prime paint all surfaces with rust-inhibiting paint.

D. Non-Structural Type:

1. Belowground Type:

- a. Non-Waterstop Type: Fabricated from any of the following: 18 gauge galvanized sheet metal, 22 gauge spiral seam galvanized steel duct, schedule 40 PVC, HDPE thermoplastic or Schedule 40 galvanized steel pipe.
- b. Waterstop Type: Constructed of HDPE thermoplastic or Schedule 40 steel pipe, with waterstop. Waterstop shall consist of 2-inch larger diameter collar, minimum 1/4 inch thick, located on sleeve so as to be centered within the element being penetrated, fully welded (for steel) or bonded/formed (for HDPE) to sleeve. Sleeve shall be suitable for use with "Link-Seal" type seal. Prime paint all surfaces with rust-inhibiting paint.

2. Aboveground Type:

- a. Non-Waterstop Type: Fabricated from 18 gauge galvanized sheet metal or 22 gauge spiral seam galvanized steel duct. Provide with galvanized steel angle tabs, collars, or similar to allow for anchoring where sleeve cannot be retained in place by element being penetrated.
- b. Waterstop Type: Fabricated from 18 gauge galvanized sheet metal or 22 gauge spiral seam galvanized steel duct. Cold galvanize cut edges of sleeve. Waterstop shall be constructed of same material as sleeve, be fully welded to sleeve, 2-inch larger diameter, located on sleeve to allow sealing of gap between sleeve and element being penetrated.

- E. Flexible Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type 1, minimum 1/2-inch thick. Water vapor permeance shall not exceed 0.08 perms. Operating Temperature Limits -20 degrees F to 180 degrees F. Provide in sheet or pre-fabricated pipe size; provide multiple wraps as required.

2.03 FIRESTOP SEALS

- A. General: Commercially manufactured through-penetration and membrane-penetration firestop systems to prevent the passage of fire, smoke and gases, and to restore the original fire-resistance rating of the barrier penetrated.
- B. Listing: Firestopping shall be listed by UL in "Fire Resistance Directory" (category to match the application), or be qualified by another independent agency acceptable to the AHJ.
- C. Rating: Firestop system and devices shall be tested in accordance with ASTM E 814 or UL 1479, with "F" and "T" ratings as required to maintain the fire-resistance rating of the barrier penetrated, and as required by code.
- D. Fire Hazard: Materials shall have a flame spread of 25 or less, and a smoke development rating of 50 or less; when tested in accordance with ASTM E 84 or UL 723.
- E. Cabling Applications: Firestop systems used with loose electrical cabling shall be the type that allows for removal of the cable or installation of new cables without damage to the firestop system, or the need to replace or repair firestop materials.
- F. Insulation: Firestop system shall be applicable to insulated systems to allow the insulation to run continuous through the firestop system (unless noted otherwise).

2.04 NON-FIRESTOP SEALS

A. Indoor Sealants:

1. Smoke or Sound Sealant Applications: For use where a firestop seal is not required, but smoke or sound seal is required. Single component, elastomeric or acrylic latex type sealant with STC ratings per ASTM E90. Sealants shall be of the following types, or approved equal:
 - a. 3M "Smoke and Sound Sealant SS100".
 - b. Tremco "Tremstop".
2. Other Areas - Dry (Not Normally Exposed to Water/Moisture): Single component, latex sealant complying with requirements of ASTM C834. Sealants shall be of the following types, or approved equal:
 - a. Tremco Corporation "Tremflex 834".
 - b. Pecora Corporation "AC-20 Acrylic Latex".
 - c. Sonneborn Building Products "Sonolac".
3. Other Areas - Wet (Exposed to Water/Moisture): Single component, mildew resistant silicone sealant complying with requirements of ASTM C920, Type S, Grade NS, Class 25. Color white. Sealants shall be of the following types, or approved equal:
 - a. Dow Corning "786 Mildew Resistant Silicone".
 - b. Pecora Corporation "898 Silicone Sanitary Sealant".
 - c. Tremco "Tremsil 200".

B. Expanding Foam Sealant:

1. General: Single component, polyurethane insulating sealant with flame spread index of 25 or less and smoke development rating of 50 or less. Shall expand and fully cure within 24 hours to a semi-rigid, closed cell, water and air resistant foam. Sealant shall be of the following types, or approved equal:
 - a. DAP "Kwik Foam".
 - b. Fomo Products "Handi-Foam".
 - c. Todol Products "EZ Flo Gun Foam".

C. Full Water Immersion Sealant: Polysulfide or Polyurethane; ASTM C920, M or Type S, Grade NS, Class 25, uses M and A; approved by manufacturer for "continuous water immersion", single or multi-component.

1. Tremco "Vulkem 116".
2. Sonneborn "Sonalastic Polysulphide Sealant".

D. Link Seal: Seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. The seal assembly shall expand when mechanically tightened to provide an absolute water-tight seal between the pipe and wall opening. Sizing shall be per manufacturer's recommendations. Seal shall be Pipeline Seal and Insulator, "Link-Seal" (or approved).

E. Specialty: Packed fiberglass or wool insulation; with silicone sealant rated for use with temperatures and other conditions encountered.

F. Grout: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout. Nonshrink; recommended for interior and exterior applications. Design mix shall provide 5000-psi, 28-day compressive strength. Premixed and factory packaged.

PART 3 - EXECUTION

3.01 PIPE SLEEVES

- A. General: Provide sleeves for all piping passing through walls, floors, partitions, roofs, foundations, footings, grade beams, and similar elements. Except that sleeves are not required at core drilled penetrations through solid concrete or where formed openings equivalent to a core drilled opening are provided. Sleeves shall be the following type (horizontal/vertical refer to position of sleeve):
1. Horizontal, Belowground:
 - a. Belowground on Both Sides of Element Penetrated: Non-structural, belowground, non-waterstop type; except that penetrations of footings shall be structural type.
 - b. Belowground on One Side of Element Penetrated: Structural type.
 2. Horizontal, Aboveground:
 - a. Concrete and Masonry Walls: Non-structural aboveground non-waterstop type.
 - b. Other Walls: No sleeve required unless needed as part of the seal system or specifically noted to be provided (i.e. for acoustic, thermal, seal retention, or other purposes). Provide clearances around pipe same as sleeve would provide (see specified sleeve size).
 3. Vertical, Slab on Grade: Structural type; except at piping serving individual fixtures or individual heating units in finished areas, the flexible type may be used. Where not installed to be concealed (as in a plumbing chase) install height of flexible type so it is concealed by the floor finish, cabinet base, or an escutcheon.
 4. Vertical, Not Slab on Grade:
 - a. Concrete Floors/Roofs: Structural type where not concealed; non-structural aboveground type where concealed.
 - b. Other Floors/Roof: Non-structural aboveground type. Use waterstop type in rooms with floor drains, at plumbing chases, and similar areas.
- B. Installation: Set sleeves plumb or level (or sloped as required for sloped pipes) in proper position, tightly fitted into the work. Set sleeves properly in element for specified projection past adjacent surfaces (see sleeve product specification); cut ends of sleeve as necessary.
- C. Insulation: Insulation shall run continuous through sleeves (unless noted otherwise).

3.02 FIRESTOP SEALS

- A. General: At each through-penetration and membrane-penetration in rated assemblies, where required to limit the passage of smoke, and as required by code or in the Contract Documents, provide a firestop system. Firestop system shall be installed in accordance with the manufacturer's instructions and listing.
- B. System Selection: Contractor is responsible to select the firestop systems to be utilized, corresponding to the construction of the assembly penetrated, and types of penetrations. Contractor shall submit proposed firestop systems to be utilized, shall also review such systems with the AHJ and obtain AHJ approval.
- C. Preparation: Prepare surfaces as recommended by firestop material manufacturer. Examine and confirm that conditions are acceptable to proceed with the installation. Provide maskings and temporary coverings to prevent contamination or defacement of adjacent surfaces.

D. Installation Review:

1. Notify Architect/Engineer when firestopping work is complete and ready for review. Provide minimum 7 days notice to allow scheduling of review. An independent testing agency may be utilized to perform an inspection.
2. Notify AHJ when firestopping work is complete and ready for inspection. Provide sufficient advance notice to allow scheduling of the inspection without adversely impacting project schedule.
3. Do not cover or conceal firestopping until all inspections have been satisfactorily completed.

3.03 NON-FIRESTOP SEALS

- A. General: Provide seals around all ducts, conduit, and piping passing through sleeves, walls, floors, roofs, foundations, footings, partitions, and similar elements. Seals shall be watertight where the penetration may be exposed to water or moisture. Provide type of sealant to suit the application. Provide smoke and sound type at all penetrations of rooms which contain mechanical equipment on both side of element penetrated to a depth of 5/8-inch (unless noted otherwise).
- B. At Sleeves:
1. Between Sleeve and Penetrated Element: Fill openings around outside of pipe sleeve with same material as surrounding construction, or with material of equivalent fire and smoke rating and properties that allow a tight seal between the sleeve and the surrounding construction. Seal full depth of sleeve for vertical penetrations.
 2. Between Pipe and Inside of Sleeve: Provide sealant between outside of pipe or pipe covering (for covered piping systems) and inside of sleeve. Seal depth shall be minimum 1-inch each side. Provide Link Seal type for belowground penetrations, vault wall penetrations, and slab-on-grade penetrations (not required where flexible type sleeves are used).
- C. No Sleeves: Provide "Link-Seal" type for belowground penetrations, vault wall penetrations, and slab-on-grade penetrations. Provide sealant at other areas, type to suit the application. Fully seal between outside of pipe or pipe covering (for covered piping systems) and surrounding construction. Seal depth shall be minimum 1-inch each side.
- D. Plumbing Fixtures: Provide sealant between fixture and abutting building surfaces. Seal so no water or overspray from fixture can enter building construction. See Section 22 40 00.
- E. High Temperature Systems: On piping systems operating above 200 deg F, use "Specialty" seal; pack full depth of penetration with silicon type sealant applied 1/2-inch depth over packing, each end.
- F. Preparation: Remove loose materials and foreign matter impairing adhesion of seal. Perform preparation in accordance with recognized standards and sealant manufacturers recommendations. Protect elements surrounding area of work from damage or disfiguration due.
- G. Installation: Install sealants immediately after joint preparation. Install sealants free of air pockets, foreign embedded matter, ridges, and sags. Tool exposed joint surface concave and with a neat finished appearance.

END OF SECTION 20 05 30

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Excavation.
- B. Trenching.
- C. Shoring and Trench Protection.
- D. Bedding.
- E. Backfilling.
- F. Compaction.
- G. Verification of Existing Utilities.
- H. Protection of Utilities.
- I. Dewatering.
- J. Identification Warning Tape.

1.03 DEFINITIONS

- A. "Utility Bedding" is defined to mean "material placed beneath the utility for utility support, and material placed adjacent to the utility to the centerline of the utility."
- B. "Utility Zone Backfill" is defined to mean "backfill material that is placed in the area from the centerline of the utility up to the specified height above the top of the utility, and is located above the utility bedding and below the final backfill material."
- C. "Trench Backfill" is defined to mean "backfill material that is placed above the utility zone backfill, and up to rough or finished grade."
- D. "Underground Mechanical Structures" are defined to mean "vaults, tanks, interceptors, separators, manholes, and similar structures buried partially or completely underground."
- E. "Unstable Material" is defined to mean "material that depresses more than 1/4-inch under a load of 2000 pound/square foot, is not firm and stable, or in any way appears incapable of supporting the loads to be imposed."

1.04 QUALITY ASSURANCE

- A. Inspection of Job Conditions: Prior to starting work and during work, the installer shall examine the work by others, site and job conditions under which excavation, trenching, and backfilling for underground mechanical utilities work will be performed, and not proceed with work until unsatisfactory conditions have been corrected.
- B. Codes and Standards: Comply with all applicable codes and standards. Grading of materials shall be done in accordance with ASTM C136 or WSDOT Standards (unless noted otherwise).

- C. Experience: Only contractors fully experienced and entirely knowledgeable in the type of work required shall work on this project. By providing bids for this project the Contractor is acknowledging that he has such expertise, and will staff the project with personnel experienced and knowledgeable in the work to be performed.
- D. Compaction Testing: Retain a certified testing laboratory to perform compaction testing on all backfilled areas to confirm that the material has been compacted to the specified density (shall be 95% unless indicated otherwise) in accordance with WSDOT Standard Specifications 2-03.3 (14).

1.05 GENERAL REQUIREMENTS

- A. Safety: Contractor is solely responsible for worker safety and for selecting and designing all trench shoring methods, trench protection methods, site utility protection means and other aspects of the work. All such means, methods, and safety measures shall comply with applicable codes and standards, and the requirements of the Contract Documents.
- B. Coordination: Coordinate all work with other trades. Coordinate with other Divisions the location and termination of all work of other trades and interconnections with Division 20 work.
- C. Scheduling: Schedule work to avoid impacts to other trades due to open trenches, dewatering, and other activities.
- D. Existing Utilities: Verify location of all existing utilities that lay in the route of intended work. Verify the location of all existing utilities that will be connected to prior to beginning work for any new utilities.
- E. Discrepancies: Notify the Architect/Engineer of any discrepancies or conflicts within the Contract Documents or between the Contract Documents and field conditions. Do not proceed with any work or purchasing of any materials for the area(s) of conflict until obtaining written instruction from the Architect/Engineer on how to proceed. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed, shall be done at the Contractor's expense. In case of a conflict between Division 20 requirements and other project requirements, the most stringent and expensive (as judged by the Architect/Engineer) shall prevail.

1.06 REFERENCES

- A. ASTM C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D1557: Laboratory Compaction Characteristics of Soil Using Modified Effort.
- C. ASTM D2419: Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- D. ASTM D2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- E. WSDOT Standard Specifications: Washington State Department of Transportation, Specifications for Road, Bridge, and Municipal Construction.

PART 2 - MATERIALS

2.01 GENERAL MATERIALS

- A. General: All materials used for bedding, backfill, and drainage purposes shall be free of debris, roots, wood, vegetation, refuse, soft unsound material, frozen material, deleterious or other objectionable material.

- B. Sand: Clean, free flowing, coarse grade sand, with sand equivalent per ASTM D2419 of 25 (minimum), and meeting the following for grading:

| <u>Sieve Size</u> | <u>Percent Passing (By Weight)</u> |
|-------------------|--|
| 3/8" Square | 100 |
| U.S. No. 4 | 90-100 |
| U.S. No. 50 | 10-40 |
| U.S. No. 100 | 3-15 |
| U.S. No. 200 | 0-7 |

- C. Pea Gravel: 3/8-inch washed pea gravel; durable particles composed of small, smooth, rounded stones or pebbles meeting the following for grading and quality:

| <u>Sieve Size</u> | <u>Percent Passing (By Weight)</u> |
|-------------------|--|
| 1/2" square | 100 |
| 3/8" Square | 85-100 |
| 5/8" Square | 50-100 |
| U.S. No. 4 | 10-30 |
| U.S. No. 8 | 0-10 |
| U.S. No. 16 | 0-5 |

2.02 BEDDING MATERIALS

- A. Standard: Gravel backfill material, with characteristics of size and shape to allow for compaction, no dimension exceeding 1-1/2 inches, and meeting the following for grading and quality:

| <u>Sieve Size</u> | <u>Percent Passing (By Weight)</u> |
|-------------------|--|
| 1-1/2" Square | 100 |
| 1" Square | 75-100 |
| 5/8" Square | 50-100 |
| U.S. No. 4 | 20-80 |
| U.S. No. 40 | 3-24 |
| U.S. No. 200 | 10.0 max. |
| Sand Equivalent | 35 min. |

- B. Special: Pea gravel or sand (per paragraph titled "General Materials").

- C. Bedding Material Application:

| <u>Utility</u> | <u>Bedding Material</u> | <u>Minimum Thickness*</u> |
|------------------------|-----------------------------|-------------------------------|
| Cast Iron Piping | Standard (or Special) | 4" |
| Steel Piping/Conduit | Standard (or Special) | 4" |
| Ductile Iron Piping | Sand (or Special) | 4" |
| Plastic Piping/Conduit | Sand | 4"*** |
| Copper Piping | Special | 4" |

* Below bottom of utility (unless noted otherwise).

***Except that HDPE piping shall use sand bedding with minimum 6-inch thickness (unless noted larger elsewhere).

2.03 UTILITY ZONE BACKFILL MATERIALS

- A. Standard: Same as specified for standard bedding materials.
- B. Special: Minus 3/8"-inch washed gravel, or sand.
- C. Utility Zone Backfill Material Application:

| <u>Utility</u> | <u>Backfill Material</u> | <u>Minimum Thickness***</u> |
|------------------------|--------------------------|-----------------------------|
| Cast Iron Piping | Standard (or Special) | 4" |
| Steel Piping/Conduit | Standard (or Special) | 4" |
| Ductile Iron Piping | Standard (or Special) | 4" |
| Plastic Piping/Conduit | Sand | 4"**** |
| Copper Piping | Special | 4" |

*** Above top of utility (unless noted otherwise).

****Except that HDPE piping shall use sand backfill with minimum 6" thickness above utility (unless noted larger elsewhere).

2.04 PIPE TRENCH BACKFILL

- A. Standard: Gravel backfill material, with size and shape to allow for compaction, no dimension exceeding 3 inches, and meeting the following:

| <u>Sieve Size</u> | <u>Percent Passing (By Weight)</u> |
|-------------------|------------------------------------|
| 2-1/2" Square | 75-100 |
| U.S. No. 4 | 22-100 |
| U.S. No. 200 | 0-10 |
| Dust Ratio | 2/3 max. |
| Sand Equivalent | 30 min. |

- B. Satisfactory Native Material: Excavated material from trenching (or other excavation on site), complying with 2.01 A., having no clods or rocks greater than 3 inches in any dimension.
- C. Material Application: Either standard or satisfactory native materials may be used (unless noted otherwise).

2.05 GENERAL BACKFILL MATERIALS

- A. Utility Foundation Backfill: Class A per WSDOT 2014, 9-03.12 (1) A.
- B. Drain Backfills: Gravel backfill for drains shall conform to the following gradings:

| <u>Sieve Size</u> | <u>Percent Passing (By Weight)</u> |
|-------------------|------------------------------------|
| 1" Square | 100 |
| 3/4" Square | 80-100 |
| 3/8" Square | 10- 40 |
| U.S. No. 4 | 0-4 |
| U.S. No. 200 | 0-2 |

2.06 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

- A. General: Polyethylene plastic tape manufactured specifically for warning and identification of buried utility lines. Tape shall be minimum 6" wide, acid and alkali resistant.

- B. Detectable Type: Minimum 0.004 inch thick, with integral wire, foil backing, or other means to allow detection of tape location. Encase metallic element in protection jacket or other means to provide corrosion protection.
- C. Non-Detectable Type: Minimum 0.003 inch thick.
- D. Labeling: Tape shall be imprinted with bold black capital letters continuously and repeatedly over the entire tape length. Warning shall read "CAUTION BURIED (utility type) BELOW" or similar wording. Lettering identifying the utility type shall match as closely as possible the designation noted on the plans. Tape lettering shall be permanent and be unaffected by moisture or other materials contained in trench backfill.

E. Tape Colors:

| <u>Utility</u> | <u>Color</u> |
|-------------------|--------------|
| Sewer | Green |
| Water | Blue |
| Non-Potable Water | Yellow |

PART 3 - EXECUTION

3.01 GENERAL

- A. Shoring and Trench Protection: Contractor is responsible to design and provide all necessary trench shoring and trench protection to:
 - 1. Provide safe conditions.
 - 2. Provide conditions that comply with applicable codes and AHJ requirements.
 - 3. Prevent undermining of pavement, foundation, slabs, utilities, and other structures.
 - 4. Prevent movements in adjacent slopes or banks.
- B. Workmanship: Work shall abide by best professional practices as described in referenced standards, and as recognized by accredited professionals.
- C. Compaction: Provide compaction to percent indicated per ASTM D 1557, of laboratory maximum density. Compact to 95 percent (unless noted otherwise). Compaction shall be accomplished by approved tamping rollers, pneumatic-tired rollers, three-wheel power rollers, or other approved compaction equipment.
- D. Grading: Provide grading to prevent surface water from flowing into areas of work to maintain the stability of the work area, and suitable working conditions.
- E. Dewatering: Provide dewatering system for the collection and disposal of surface and subsurface water encountered during construction in order to maintain conditions suitable for the work. Provide all pits, drainage conveyances, pumps, dikes, etc. as required to accomplish the work.
- F. Underground Utilities: Location of utilities indicated is approximate. Verify the location of all existing utilities prior to beginning work; utilize field electronic detection equipment, pipe cameras, visual site surveys, and careful exploratory digging at key locations. Coordinate with other trades routing and locations of all new utilities to avoid conflicts and ensure proper connections.
- G. Machinery and Equipment: Movement of construction machinery and equipment over buried and backfilled pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged. Pressure testing of piping before final Owner acceptance is required to verify no damage has occurred.

- H. Protection: Protect all areas of work from traffic, erosion, weather, settlement or other damaging effects. Protect all existing utilities from damage.
- I. Jacking, Boring and Tunneling: Unless otherwise indicated, excavation shall be by open cut, except that sections of a trench may be jacked, bored or tunneled if the utility can be safely and properly installed and backfill can be properly tamped in such sections.
- J. Buried Warning and Identification Tape: Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade. Provide detectable type over non-metallic piping systems. Piping systems installed within the building footprint does not require identification tape.

3.02 EXCAVATION - GENERAL

- A. General: Provide all excavation as necessary to allow for the work indicated. Excavations for underground mechanical structures shall be sufficient to provide a minimum of 12 inches clearance between their surfaces and the sides of the excavation.
- B. Excavated Material:
 - 1. Stockpiles: Stockpile materials satisfactory for backfilling in an orderly manner at a safe distance from the excavation to avoid overloading the sides of the excavated area and to prevent slides or cave-ins.
 - 2. Protection: Protect stockpiles from contamination with unsuitable backfill materials. Provide adequate drainage at stockpiled areas to prevent water retention in material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced with satisfactory on-site or imported material from approved sources at no additional cost to the Owner.
 - 3. Disposal: Excavated material not required or not satisfactory for backfill or other uses on site shall be removed and disposed off site.

3.03 TRENCH EXCAVATION

- A. General: Excavate trenches to accommodate utility, required utility slopes, depths of connecting utility, existing and new utilities, required cover depth, and site conditions.
- B. Removal of Unsuitable Material:
 - 1. Unstable Material: Where unstable material is encountered in the bottom of the trench, such material shall be removed by over excavation of the trench bottom 4 inches below the depth otherwise required. Contractor is responsible for all costs associated with removal and replacement of unstable materials. For bidding purposes, assume that a minimum of 10% of all excavated bottom utility bearing areas will have unstable material.
 - 2. Rocks and Stones: Stones of 6 inches or greater in any dimension, and any rock or stone of any size/orientation that may disrupt the pipe bedding thickness or pipe supports shall be removed. Rock shall be removed to 4 inches below the bottom of the pipe bearing elevation.
 - 3. Other: Any wood, refuse, waste, organic material, or other material which would adversely affect pipe support shall be removed. For bidding purposes, assume that 5% of all trench bottom area will have objectionable material as described in this paragraph.
 - 4. Replacement Material: Replace removed unsuitable material with "Utility Foundation Material" as specified under paragraph titled "General Backfill Materials", or with bedding material specified for the piping to be placed in the trench.
- C. Bottom Preparation: Bottoms of trenches shall be accurately graded to provide uniform bearing and support for each section of pipe (or other utility) after bedding placement, and proper slope of piping.

- D. Depth: Trench shall be adequate to provide a minimum depth of cover required to meet connecting utilities; but minimum 1 foot of cover (unless indicated otherwise).

3.04 BEDDING

- A. Pipe Bedding: Provide even bedding placement along the entire length of the pipe to support pipe on a uniformly dense unyielding foundation, without load concentration at joint collars or bells. Bedding shall be installed and compacted prior to installing pipe. Bedding located beneath piping shall have minimum thickness specified in Part 2 of specifications, and be compacted to 90% maximum density. Recesses shall be excavated as necessary at each joint or coupling to eliminate point bearing and to allow uniform pipe support by the bedding material the entire pipe length. Haunching shall be installed in maximum 4 inch lifts, hand placed and carefully worked under the pipe haunches and then compacted to 90% maximum density. All adjustment to line and grade shall be made by scraping away or filling in with bedding material under the body of the pipe and not by blocking or wedging. Bedding disturbed by pipe movement, or by removal of shoring movement of a trench shield or box, shall be reconsolidated prior to backfill.
- B. Other Utility Bedding: Provide even bedding to allow for full support of the installed item on a uniform dense unyielding foundation. Bedding shall be installed and compacted before installing ducts or underground mechanical structures. Bedding shall have minimum of thickness specified in Part 2 of specifications, and be compacted to 95% maximum density.

3.05 BACKFILLING

- A. General: Provide backfill of all trenches and underground mechanical structures to grade. Provide adequate initial backfill to allow proper pressure tests, and inspections by AHJ and Architect/Engineer. Leave joints and couplings uncovered as necessary to discover pipe leaks. Do not conceal underground utilities until AHJ and Architect/Engineer have reviewed utilities.
- B. Utility Zone Backfilling: Backfill shall be placed in loose layers and compacted to 90 percent maximum density. Backfill shall be placed in horizontal layers no more than 6-inches thick. Backfill shall be brought up simultaneously on each side of the utility to the top of the utility, and onto the specified height above the utility (see Part 2 of specifications). Backfill and compact in a manner to avoid damaging or disturbing the completed utility.
- C. Pipe Trench Backfilling: Backfill above the pipe zone backfill shall be accomplished in such a manner that the pipe will not be shifted out of position nor damaged by impact or overloading. Where pipe is outside the building footprint, backfill shall be placed in horizontal layers no more than 6 inches thick and compacted to 95 percent maximum density. Where pipe is inside the building footprint, backfill shall be placed in horizontal layers no more than 6 inches thick and be compacted to 85 percent maximum density.
- D. Other Utility Backfill: Backfill shall be accomplished in such a manner that the utility will not be shifted out of position nor damaged by impact or overloading. Backfill shall be placed in horizontal layers no more than 6 inches thick and be compacted to 95 percent maximum density.

END OF SECTION 20 05 90

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Air Balancing.
- B. Plumbing System Water Balancing.
- C. Report.

1.03 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Company: Submit name of Company proposed to do the balancing and sample balancing forms. Where the Company has not been pre-qualified, and substitutions are allowed after bidding (see Division 00 and 01), submit information regarding firm qualifications.
- C. Personnel: Submit list of personnel that will be assigned to the project and their qualifications, and list of past projects.
- D. Reports: Preliminary and final balancing reports.

1.04 REFERENCES

- A. AABC-NS: Associated Air Balance Council, National Standards for Field Measurements and Instrumentation.
- B. ASHRAE: Handbook of Fundamentals.
- C. ACGIH-IV: American Conference of Governmental Industrial Hygienists, Industrial Ventilation, A Manual of Recommended Practice.
- D. NEEB-PS: National Environmental Balancing Bureau Procedural Standard for Testing, Adjusting and Balancing Environmental Systems.

1.05 GENERAL REQUIREMENTS

- A. General: Balancing shall be done by a company which specializes in this type of work and is totally independent and separate from the Company which has installed the systems to be balanced.
- B. Balancers Qualifications:
 - 1. General: Work of this Section shall be performed by balancing firms meeting the following and having prior approval from the Engineer:
 - a. Professional Affiliation: Firm shall be an Associated Air Balance Council (AABC) member balancer or National Environmental Balancing Bureau (NEBB) certified balancer.

- b. Experience: Firm shall have satisfactorily completed the balancing work for at least 5 similar projects in the last 3 years. Similar is defined to mean: within 10% of the same quantity of units and air inlets/outlets, involve same type of systems, be the same type of facility (i.e. school, hospital, etc.). The lead field balancer (i.e. the individual who will be on site directing and participating in the balancing efforts) shall have at least 5 years of experience performing balancing work on similar projects.
 - c. References: Have five references for similar projects which have been completed in the last three years that will give a good or better performance rating. References shall be engineers, architects, or building owners. As part of the qualification process at least three of these references will be contacted and a rating obtained for the following: timeliness of work (i.e. able to complete work on schedule), cooperative nature of balancer's staff (i.e. ability to work well as a team with other project trades and professionals), overall quality of balancing work, quality of balancing report. Each item will be rated on a scale of 1 to 5 (5 being excellent), with the result averaged, score must be of 4 or better.
- 2. Pre-Qualified Balancers: As a convenience to the Contractor, the following balancing firms have been pre-qualified. This is not in any way intended to limit competition or prevent other firms from submitting qualifications, but is intended as an aid to Contractors by identifying firms that have been confirmed as meeting the qualification requirements.
 - a. Neudorfer Engineers
 - b. Hardin and Sons
 - c. Test Comm
 - d. Advanced Mechanical Services
 - e. Testing and Commissioning (TAC) Services
 - f. AccuABC
- 3. Qualification Process: Firms not pre-qualified who desire to perform the balancing work shall submit a substitution request form in accordance with Contract Document requirements (reference Division 00 and 01). In addition to the information required on the substitution request form, submit: Company information, resumes of staff to be assigned, lists of projects, and references (with name of project, staff assigned to project, and contact name and phone number).
- C. Balancing Issues: Notify the Engineer in writing of all problems or discrepancies between actual conditions and what design documents show as work proceeds.
- D. Engineer's Authority: The Balancer shall be directly responsible to the Engineer and shall perform this work and make system adjustments as directed by the Engineer.
- E. Lead Balancer: The Balancer shall assign an individual as "lead balancer" to work in the field to directly supervise the balancing work and field technicians. This lead field balancer shall have at least 5 years of experience performing balancing work on similar projects.

1.06 SCOPE OF AIR BALANCING

- A. Balance existing AHU for total exhaust and supply airflows indicated. Adjust VFD's and adjust/replace fan sheaves as necessary.

PART 2 - PRODUCTS

2.01 GENERAL INSTRUMENTATION

- A. General: Balancing equipment shall comply with Associated Air Balance Council recommendations for field measurement instrumentation.
- B. Calibration: All measuring instruments shall be accurately calibrated and maintained in good working order. Calibration dates and certifications shall be available at Engineer's request.
- C. Instruments: Shall be capable of:
 - 1. Air velocity instruments, direct reading in feet per minute with 2% accuracy.
 - 2. Static pressure instruments, direct reading in inches water gauge with 2% accuracy.
 - 3. Tachometers, direct reading in revolutions per minute with 1/2% accuracy; or revolution counter accurate with 2 counts per 1,000.
 - 4. Thermometers, direct reading in degrees Fahrenheit with 1/10 of a degree accuracy.
 - 5. Pressure gauges, direct reading in feet of water or psig with 1/2% accuracy.
 - 6. Water flow instruments, direct reading in feet of water or psig with 1/2% accuracy suitable for readout of balancing valve provided.
- D. Potable Water: Instruments used in contact with potable water shall be cleaned and disinfected before use with a chlorine solution.

PART 3 - EXECUTION

3.01 GENERAL

- A. Workmanship: All measurements and adjustments shall be in accordance with AABC-NS, NEEB-PS, and ACGIH-IV and recognized best balancing procedures. Measurements and adjustments of equipment shall be executed in a manner consistent with the manufacturer's recommendations.
- B. Flow Rates:
 - 1. General: All air and water systems shall be completely balanced and adjusted to provide the flow rates indicated (within tolerances indicated in this specification Section), and to produce an even heating and cooling effect and control response and to produce even water circulation.
 - 2. Balancer Determined: Where flow rates have not been indicated the balancer shall determine such flow rates using acceptable practices in accordance with AABC-NS, NEEB-PS, and ASHRAE standards and submit the proposed flow rates to the Engineer for review.
 - 3. Confirmation: Prior to beginning balancing confirm any flow rate changes since design with the submittals and flow rates indicated therein, and with the Engineer to confirm changes made since design. Assume that new flow rates will be issued.
- C. Controls: Consult and coordinate with the Control Contractor for the adjustment and setting of all control devices to allow for the balancing work, and for proper system operation and proper flow rates. Set all controls and valves as required to maintain design flow rates and temperatures as shown on the drawings. Make measurements and provide data to the Control Contractor to allow for proper control of items.

- D. Comfort Adjustments: Make final adjustments for flow rates in order to optimize each space's comfort, including such considerations as temperature, drafts, noise, pressurization, and air changes. Where variances are made from design values, state reasons in report (e.g., "too noisy", "too drafty," etc.). All such variances are subject to approval by the Architect/Engineer.
- E. Deficiency Reports: Submit deficiency reports where the work does not allow balancing to occur or balancing issues develop. Indicate date, system and equipment involved, location, description of deficiency, and related information to allow for diagnosing the problem. Provide suggestions for resolution where possible.

3.02 AIR BALANCING

- A. Pre-check of System: Prior to beginning balancing, perform, as a minimum, the following:
 - 1. Verify that clean filters have been installed, that system is free from debris, and that all inlets/outlets are not obstructed.
 - 2. Check all fans and equipment to verify that proper start-up and system preparation has been done by the installing contractor.
 - 3. Check all door/window and similar building opening status to insure building is ready and proper pressurization can be obtained.
 - 4. Open all dampers to full flow position, check positions and operation of all motorized dampers to allow full system flows.
 - 5. Review controls and sequences of operation.
- B. Tolerances: All air flow rates (supply, return, and exhaust) shall be adjusted to within plus 5 percent and minus 5 percent of the values shown in the contract documents, except that relative space-to-space pressure relationships shall always be maintained (e.g., restrooms shall be negative relative to other areas, general offices shall be positive, etc.).
- C. Draft and Noise Adjustments: All diffusers, grilles, and registers shall be adjusted to minimize drafts and to eliminate objectionable noise.
- D. Filters: Air balancing shall be done with new, clean air filters installed. Adjust air deliveries so that design quantities will be obtained when filters are half dirty. This condition shall be simulated by covering a portion of the filter area.
- E. Fan Speeds and Drives:
 - 1. Adjust fan speeds and fan drives (adjustable sheaves) as required to produce design flow rates.
 - 2. Where new sheaves are required, calculate sizing of new sheave and coordinate requirements with the Division 23 Contractor; Division 23 Contractor to furnish new sheaves. Replace existing sheave with new one furnished by the Division 23 Contractor; include bid costs for sheave replacements on all 50% of belt driven fans.
 - 3. Adjust belts for proper tension.
- F. Marking: Upon completion of flow readings and adjustments permanently mark the balanced position of all balancing valves by stamping the indicator plate of the valve.
- G. Duct Traverse: Rectangular duct traverses shall measure the center of equal areas in the air flow stream, with centers not more than 6 inches apart. Round duct traverses shall measure at least 20 locations, with locations being the centers of equal annular area. Reference ACGIH Industrial Ventilation Manual.

- H. One Open Run: Balance each branch run so that there is at least one wide open run; balance branches relative to one another so that at least one branch damper is wide open (except that where unique conditions exist, and the Engineer gives prior approval, one open damper on runs or branches is not required).
- I. Data: Data to be measured/recorded and provided in report for all air handling systems and equipment:
 - 1. Floor plans clearly showing and identifying all diffusers, grilles, OA louvers, ducts and all other items where air flow rates were measured.
 - 2. Identify manufacturer, model number, size, and type of all air inlets/outlets.
 - 3. Initial, trial, and final air flow measurements for all diffusers, grilles, OA louvers, ducts, and all other items where air flow rates were measured.
 - 4. Design air flow rates and percentage final air flow rates are of design values.
 - 5. Final damper (or other balance device) final position (as a percentage of full open).
 - 6. The connected voltage and corresponding nameplate full load amps, and the initial and final amperages of all fan motors.
 - 7. Initial and final RPMs of all fans.
 - 8. Static pressures on inlet and outlet of all fans.
 - 9. Fan initial and final CFMs.
 - 10. Outdoor air CFMs (record minimum and maximum values).
 - 11. Entering and leaving air temperatures across coils with coils operating at 100% capacity.
 - 12. Static pressure drop across each filter bank and coil.
 - 13. Final position of any speed controls (as percent of full).
 - 14. In addition to data noted elsewhere, provide the following for all equipment which are part of balanced systems:
 - a. Equipment name and number (as used on drawings).
 - b. Service.
 - c. Equipment manufacturer and model number.
 - d. Sheave and belt sizes (where applicable).
 - e. Filters sizes and quantities (where applicable).
 - f. Motor manufacturer and complete nameplate data.
 - g. Design operating conditions.
 - h. Actual operating conditions (flows, pressure drops, rpm, etc.).

3.03 WATER BALANCING - PLUMBING

- A. Pre-check of System: Prior to beginning balancing, perform, as a minimum, the following:
 - 1. Verify that all strainers have been cleaned.
 - 2. Examine fluid in system to verify system condition; balancing is to occur before system disinfection but with system in adequate clean condition.
 - 3. Check for proper rotation and operation of all pumps.
 - 4. Verify that expansion tanks are not air bound and properly charged and that system is full of fluid.
 - 5. Remove air from the circulating system by opening all fixture valves to full flow position allowing system to flow.
 - 6. Check equipment for proper start-up and system operation.
 - 7. Review controls and sequences of operation.

- B. Tolerances: All water flow rates shall be adjusted to within plus 10 percent and minus 10 percent of the values shown in the contract documents (or as determined by the balancer where not indicated).
- C. Domestic Hot Water Systems: Balance domestic hot water system to provide even flow distribution to allow hot water to reach all fixtures. Use only clean instruments on system and perform balance prior to sterilizing of system. Where flow rates are not indicated, proportion pump water flow rate based on the linear footage of system served.
- D. Marking: Upon completion of flow readings and adjustments permanently mark all settings of balancing valves.
- E. Data to be measured/recorded and provided in report:
 - 1. Floor plans or schematics showing and identifying all valves, coils, pumps and other items where temperatures, pressure drops, or water flow rates were measured.
 - 2. Identify manufacturer, model number, size and type for all balancing devices.
 - 3. Initial, trial, and final water flow measurements (pressure drops, temperatures, and GPMs) for all items where measurements were made.
 - 4. Design water flow rates, and percentage final water flows are of design values.
 - 5. The connected voltage and corresponding nameplate full load amps, and the initial and final amperages of all pump motors.
 - 6. Pump operating suction and discharge pressures and final total developed head.
 - 7. Pump initial and final GPMs.
 - 8. Final position of all valves (percent open or setting position on valve).
 - 9. Final position of any speed controls (as percent of full).
 - 10. In addition to data noted elsewhere, provide the following for all equipment which are part of balanced systems:
 - a. Equipment name and number (as used on drawings).
 - b. Service.
 - c. Equipment manufacturers and model number.
 - d. Equipment capacities.
 - e. Motor manufacturer and complete nameplate data.
 - f. Design operating conditions.
 - g. Actual operating conditions (flows, pressure drops, etc.).

3.04 BALANCING REPORT

- A. General: A balancing report shall be submitted as specified herein, documenting all balancing procedures and measurements.
- B. Report Organization: The report shall be divided into logical sections consistent with the building or system layout (i.e. by floors, building wings, air handling units, or other convenient way). Tabulate data separately for each system. Describe balancing method used for each system.
- C. Preliminary Report: Two preliminary review copies of the balancing report shall be submitted to the Architect/Engineer when the balancing work is 90% complete (or as near 90% complete as possible due to uncompleted work of other trades). In addition to containing all the information required of the final report, the preliminary report shall contain a list of all the work required of other trades in order to allow the balancing work to be completed. The Architect/Engineer will review the preliminary report and inform the Contractor of any additional items or revisions required for the final report. Preliminary reports may be omitted where the Architect/Engineer grants approval.

- D. Final Report: Shall be included in the Operation and Maintenance Manual. Submit reports to Contractor for inclusion in Manuals (or, when manuals have been already sent to Engineer, send report to Engineer who will insert report into Manual). Provide number of reports as required to match quantity of O&M Manuals, but in no case less than five.
- E. Format: 8-1/2" x 11" size, neat, clean copies, drawings accordion folded. Report shall be typed, shall have a title page, table of contents, and divider sheets with identification tabs between sections. Information shall be placed in a three hole notebook, with the front cover labeled with the name of the Job, Owner, Architect/Engineer, Balancing Contractor, and Report Date.
- F. Electronic Copy: Provide copy of reports in *.pdf format; submit final report with closeout documents per Divisions 00 and 01.
- G. General Balancing Information Required:
 - 1. At the beginning of the report, include a summary of problems encountered, deviations from design, remaining problems, recommendations, and comments.
 - 2. List of instruments used in making the measurements and instrument calibration data.
 - 3. Names of personnel performing measurements.
 - 4. Explanation of procedures used in making measurements and balancing each system.
 - 5. List of all correction factors used for all diffusers, grilles, valves, venturi meters, and any other correction factors used.
 - 6. Areas where difficulties were encountered in obtaining design flow rates, or where unstable operating conditions may exist.
 - 7. Note any parts of the system where objectionable drafts or noises may be present and efforts made to eliminate same and why they may still be present.
 - 8. Note where variances from design values occur; explain why.
 - 9. All specified measurements, balancing data, any additional recorded data, and observations.

END OF SECTION 20 05 93

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Duct Insulation.
- B. Pipe Insulation.
- C. Equipment and Specialties Insulation.

1.03 DEFINITIONS

- A. R: Thermal resistance of insulation, in units of hr-sf-deg F/Btu.
- B. Rainleader Piping: Any piping or conduit that is used to carry rain water, including overflow drain piping, that is located within the building or enclosed by any building construction.
- C. Subject to Damage: Items installed exposed less than 8 feet above the walking surface (i.e. floor, platform, roof, grade, etc.) adjacent to the item.
- D. Cold Surfaces: Surfaces that will have operating temperatures below the temperature of the surrounding air by at least 5 deg F or more; includes chilled water piping, cooling condensate piping, air conditioning ductwork, outdoor air ductwork, and similar systems. Surfaces shall be considered a cold surface unless specifically indicated otherwise.

1.04 QUALITY ASSURANCE

- A. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E 84, NFPA 255, and UL 723.

1.05 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Provide product data on all insulation materials to be used. Indicate thicknesses to be used.

1.06 GENERAL REQUIREMENTS

- A. Code Compliance: Contractor shall insulate all systems with the materials and thicknesses as required by code, but in no case shall the insulation be less than that specified herein. In some cases the specified insulation exceeds code, and shall be provided as specified. Not all systems requiring insulation by code are specified, but shall be provided with insulation where required by code.
- B. Insulation at Hangers: Insulation shall be continuous through hangers on all insulated systems (except ductwork). Inserts at hangers are specified in Section 20 05 29 and are considered as part of the hanger and support system. Inserts are required to be installed at the time of pipe installation and are intended to be installed by the Contractor installing the pipe hangers/supports. See Section 20 05 29.
- C. All adhesives, sealants, mastics and similar materials shall be low-VOC type.

1.07 REFERENCES

- A. ASTM A 653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- B. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM C 411: Standard Test method for Hot-Surface Performance of High Temperature Thermal Insulation.
- D. ASTM C 547: Standard Specification for Mineral Fiber Pipe Insulation.
- E. ASTM C 1136: Standard Specifications for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
- F. ASTM C 1290: Standard Specification For Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
- G. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. NCIS: National Commercial & Industrial Insulation Standards, published by Midwest Insulation Contractors Association, 5th Edition.
- I. NFPA 255: Standard Method of Test of Surface Burning Characteristics of Building Materials.
- J. UL 723: Tests for Surface Burning of Building Materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph Part 2.01, Acceptable Manufacturers.
- B. Insulation: Johns Manville, Armacell, Owens-Corning, Knauf, Rubatex, Aeroflex, Pittsburgh Corning, GLT, Halstead, Gilsulate, Manson.
- C. Accessories: Johns Manville, Armacell, Owens-Corning, Knauf, Rubatex, Aeroflex, Pittsburgh Corning, GLT, Halstead, Duro Dyne, Gustin Bacon, Childers, RPR, Tee Cee, Lewco Specialty Products, JPS, Buckaroos, Manson.

2.02 DUCT INSULATION

- A. Flexible Glass Fiber:
 - 1. Type: Flexible blanket type, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 1290, Type III. Johns Manville "Microlite" (or approved).
 - 2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforced with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape, minimum 2 inches wide, constructed of jacket material with adhesive to seal all joints.
 - 3. Thermal Conductivity: Shall not exceed 0.27 Btu-in/hr-sq ft-deg F at 75 deg F.
 - 4. Operating Limits: 40 degrees F to 250 deg F.
- B. Rigid Glass Fiber:
 - 1. Type: Rigid board type, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 612, Type 1A and 1B. Johns Manville "800 series Spin-Glas".

2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforced with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape constructed of jacket material with adhesive to seal all joints.
 3. Thermal Conductivity: Shall not exceed 0.23 Btu-in/hr-sq ft-deg F at 75 deg F.
 4. Operating Temperature Limits: 40 deg F to 450 deg F.
- C. Corner Angles: 0.016 inch thick aluminum, alloy 3003 or 5005, with factory applied Kraft backing, complying with ASTM B 209.
- D. Weather Barrier Mastic: Water based vinyl-acrylic mastic for outdoor weather protection of thermal insulation; fire resistant, UV deterioration resistant. Childers "Vi-cryl" (or approved equal).
- E. Glass Fiber Mesh: Open weave glass fiber reinforcing mesh for use with insulation coatings to bridge gaps and add strength to the coating. Minimum 5 strands x 5 strands per square inch. Non-combustible Childers "Chil-Glas" (or approved equal).
- F. Metal Jacket:
1. Steel: Minimum 24 gauge galvanized steel complying with ASTM A 653. Provide with longitudinal slip joints and 2-inch laps.
 2. Aluminum: Minimum 0.020-inch thick aluminum, alloy 3003 or 5005, complying with ASTM B 209. Provide with longitudinal slip joints and 2-inch laps.
- G. PVC Jacket: UV resistant polyvinyl chloride covering, minimum 20 mil thick, with joints secured and sealed with "Perma-Weld" Adhesive. Johns Manville "Zeston 300" (or approved).
- H. Duct Insulation Types:
1. Aboveground-Inside Buildings:
 - a. Exposed-Subject to Damage:
 - 1) Rectangular Ducts: Rigid glass fiber with metal corner angles.
 - 2) Round/Oval Ducts: Flexible glass fiber with PVC or metal jacket.
 - b. Exposed - Not Subject to Damage: Flexible glass fiber.
 - c. Concealed: Flexible glass fiber.
- I. Duct Insulation Thickness:
1. General: Provide insulation densities and thicknesses to achieve the R values cited below. R values are for the insulation only, in their installed thickness, considering installed duct wrap stretch and in accordance with code.
 2. Lining: Where ducts have internal lining, the insulating properties of the lining may be credited toward meeting the required insulation R value; use R-3.65 per inch of installed liner.
 3. Supply Air Ductwork:
 - a. Inside Building and Within Building's Thermal Envelope: R-3.3 (except where ran exposed in conditioned spaces, no insulation is required).
 - b. Inside Building But Not Within Building's Thermal Envelope: R-7.3.
 4. Return Air Ductwork:
 - a. Inside Building and Within Building's Thermal Envelope: No insulation required; except where duct contains air that may vary by 10 deg F or more from the space the duct passes through, R-3.3 insulation shall be provided.
 - b. Inside Building But Not Within Building's Thermal Envelope: R-7.3.

5. Outside Air Ductwork: Shall be insulated same as required for the building envelope; except where allowed by code to be insulated less than the building envelope, shall be R-8; insulation is not required where duct run outside the building.
6. Exhaust, Relief, and Special Ductwork:
 - a. Inside Building and Within Building's Thermal Envelope:
 - 1) Temperature of Air in Duct within 10 Deg F of Temperature of Air in Spaces Duct Passes Through: No insulation required except ductwork from the system's backdraft damper (or motorized damper) to outside the building shall be insulated same as required for the building envelope.
 - 2) Temperature of Air in Duct more than 10 Deg F Different from temperature of Air in Spaces Duct Passes Through: R-8.3; except ductwork from the system's backdraft damper (or motorized damper) to outside the building shall be insulated same as required for the building envelope (but no less than R-8.3).
 - b. Inside Building But Not Within Building's Thermal Envelope: R-8.3.

2.03 TRENCH INSULATION

- A. Type: Dry free flowing granular product. Designed for insulation of underground duct piping systems. Gilsulate "500XR" (or approved).
- B. General: Formulated from selected inert inorganic materials. Non-toxic, non-flammable, require no mixing prior to installation, and no curing. Shall be completely compatible with all materials used with, and for system operating temperatures of 35 degrees F to 800 degrees F. The insulation shall be composed of granular particles in a graded sizing, ranging from a maximum diameter of 1 mm down to sub-micron sizes in order to provide compatibility and adequate load bearing capability.
- C. Hydrophobic: The granules shall be surface treated to render them hydrophobic. When compacted to 40-42 lb/cu-ft, the insulation envelope shall be capable of withstanding moisture penetration equivalent to a 48-inch hydrostatic head.
- D. Loading: The compacted insulation shall be capable of withstanding up to 12,000 psf at an insulation density of 40-42 lb/cu-ft.
- E. Thermal Conductivity: The insulation shall have a thermal conductivity not greater than 0.60 Btu-in/ hr-sq ft-deg F at a bulk density of 40 lbs/cu-ft at 175 degrees F and 0.65 Btu-in/ hr-sq ft-deg F at 300 degrees F.
- F. Electrical: Electrical resistivity of the insulation shall be greater than 1012 Ohm-cm.
- G. Pipe Cushion: Mineral fiber insulation, 3 to 5 lb/cu-ft density, designed/layered to accommodate expansion and contraction.
- H. Bitumastic Coating: Self-priming, heavy duty, cold applied waterproof coating; derived from tar and solvents, and for protection of steel from corrosion. Carboline "Bitumastic 50" or equal.
- I. Steel Angles: Carbon steel per ASTM A36, size as noted on plans.

2.04 PIPE INSULATION

- A. Glass Fiber:
 1. Type: Rigid molded type, constructed of glass fibers bonded by a thermosetting resin, complying with ASTM C 547 Type I. Insulation factory molded to match pipe size applied to. Johns Manville "Micro-Lok" (or approved).

2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforced with glass fiber and bonded to aluminum foil, with longitudinal self sealing closure system. Provide with butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.
 3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/ hr-sq ft-deg F at 75 deg F.
 4. Operating Temperatures: 0 deg F to 850 deg F.
- B. Elastomeric Insulation:
1. Type: Flexible cellular elastomeric insulation, factory formed to match pipe sizes applied to, complying with ASTM C 534, Type 1. Armacell "AP/Armaflex SS" (or approved).
 2. Thermal Conductivity: Shall not exceed 0.27 Btu-in/ hr-sq ft-deg F at 75 deg F.
 3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.
 4. Operating Temperatures: -200 deg F to 220 deg F; shall be able to withstand 250 deg F temperatures for 96 hours per ASTM C 411 without damage or deformation.
 5. Weather Protection: Where installed outdoors provide with metal jacketing to protect from UV and weather exposure.
- C. Cellular Glass Insulation:
1. Type: Rigid closed-cell glass insulation, factory formed to match pipe size applied to. Pittsburgh Corning "Foamglas" (or approved).
 2. Jacket: Field applied heat sealable water-proof jacketing, consisting of 3 layers of a polymer modified bituminous compound separated by glass fiber reinforcement and aluminum foil. Water vapor permeance shall not exceed 0.00 perms. Pittsburgh Corning "Pittwrap" (or approved).
 3. Thermal Conductivity: Shall not exceed 0.29 Btu-in/ hr-sq ft-deg F at 75 deg F.
 4. Operating Temperatures: -450 deg F to 900 deg F.
 5. Compressive Strength: 90 psi.
- D. Pipe Fittings: Shall be covered using any one of the following methods of the Contractor's choice:
1. Prefabricated segments of pipe insulation of same materials and thickness as the adjoining pipe insulation, formed to match pipe fitting.
 2. Pre-cut fiberglass insulation and pre-molded high impact, gloss white, UV resistant, minimum 20 mil thick, PVC covers suitable for the pipe size and insulation thickness application, PVC cover shall be Johns Manville "Zeston 2000 PVC" (or approved).
 3. Insulating plastic cement brought up the full height of the adjacent covering.
 4. Except, where colored PVC jacketing is applied to piping, fittings shall use PVC covers of the same thickness and color as the PVC jacketing specified for the piping.
- E. PVC Jacket: Pre-molded 30 mil thick PVC jacket; size and shape to match piping and fittings applied to. Johns Manville "Zeston Series 2000" (or approved). Provide in white color.
- F. Pipe Insulation Types:
1. Aboveground-Inside Building:
 - a. Other Systems: Glass fiber.
 2. Underground:
 - a. Domestic Water Piping: Cellular glass.

G. Pipe Insulation Thickness:

1. General: Provide minimum piping insulation thickness indicated, in inches.

| INSULATION THICKNESS (INCHES) | | | | | |
|---|-----|--------------------|-----------------|------------|-----|
| Nominal Pipe Diameter (Inches) | | | | | |
| Fluid Design Operating Range, deg F | <1 | 1< to 1- 1/2 | >1-1/2 to <4 | 4 to <8 | ≥8 |
| Above 350 | 4.5 | 5.0 | 5.0 | 5.0 | 5.0 |
| 251 - 350 | 3.0 | 4.0 | 4.5 | 4.5 | 4.5 |
| 201 - 250 | 2.5 | 2.5 | 2.5 | 3.0 | 3.0 |
| 141 - 200 | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 |
| 61 - 140 | 1.0 | 1.0 | 1.5 | 1.5 | 1.5 |
| 40 - 60 | 0.5 | 0.5 | 1.0 | 1.0 | 1.0 |
| Below 40 | 0.5 | 1.0 | 1.0 | 1.0 | 1.5 |

2. Varying Temperatures: Where a system operates over temperature ranges calling for different insulation thicknesses, the thicker insulation requirements shall be met.
3. Cold Water: Cold water piping shall be considered to operate at 56 deg F (unless noted otherwise).
4. Trench Insulation: Provide insulation thickness and minimum distances between pipes to provide R values equivalent to that provided by fiberglass insulated piping with the thickness noted above. Provide greater insulation thickness where shown on plans.

2.05 EQUIPMENT AND SPECIALTIES INSULATION

- A. P-traps and HW/CW Lines on ADA Compliant Sinks and Lavatories: Prefabricated insulation specially designed for p-trap application, with white elastomeric insulation, white high gloss pvc cover, and velcro closure. Provide section for insulating HW stop and CW stop and associated piping of same material. McGuire "Pro-Wrap" (or approved).
- B. Flexible Glass Fiber:
 1. Type: Flexible blanket insulation, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 553, Type III. Johns Manville "812 Spin-Glas" (or approved).
 2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforced with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape constructed of jacket material with adhesive to seal all joints.
 3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/ hr-sq ft-deg F at 75 deg F.
 4. Operating Temperature Limits: 40 deg F to 450 deg F.
 5. Density: 1.5 lb/cu ft.
- C. Semi-Rigid Glass Fiber:
 1. Type: Semi-rigid board insulation, constructed of inorganic glass fibers bonded by a thermosetting resin.
 2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforced with glass fiber and bonded to aluminum foil, with longitudinal self sealing closure system. Provide with butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.
 3. Thermal Conductivity: Shall not exceed 0.29 Btu-in/hr-sq ft-deg F at 75 deg F.

4. Operating Temperature Limits: 0 deg F to 650 deg F.
- D. High Temperature Flexible Glass Fiber:
1. Type: Flexible blanket insulation, constructed of "E" type glass filament mechanically needled together. GLT "Tempmat" (or approved).
 2. Thermal Conductivity: Shall not exceed 0.40 Btu-in/ hr-sq ft deg F at 300 deg F.
 3. Operating Temperature Limits: 40 deg F to 1200 deg F.
 4. Thickness: Two wraps of 1-inch thick each wrap.
 5. Jacketing: Wire inserted fiberglass cloth closure; minimum 32 Ounce/yard, rated for 100 deg F; with steel lacing and lacing anchors having self locking washers.
- E. Elastomeric:
1. Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type II.
 2. Thermal Conductivity: Shall not exceed 0.30 Btu-in/ hr-sq ft-deg F at 75 deg F.
 3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.
 4. Operating Temperatures: -200 deg F to 220 deg F; shall be able to withstand 250 deg F temperatures for 96 hours per ASTM C 411 with damage or deformation.
 5. Weather Protection: Where installed outdoors provide with metal jacketing to protect from UV and weather exposure.
- F. Removable Insulation Blankets:
1. Type: Flexible blanket insulation pads, for insulating valves, unions, strainers and similar items. Constructed of exterior fabric enclosure sewn around interior insulation, held in position with a closure system that allows for removal of the blanket. Contractor or factory fabricated.
 2. Enclosure: Silicone impregnated glass fiber cloth; chemical and oil resistant; water proof; flame and abrasion resistant; minimum 20 ounce/square yard weight; rated for 500 degrees F continuous service. Lewco Specialty Products 3000 SA-2 (or approved).
 3. Insulation: Thermal insulating wool, 1-inch thick, complying with ASTM C 553. Maximum thermal conductivity 0.22 Btu-in/ hr-sq ft-deg F at 75 degrees F. Provide in layers to give equivalent R value to the adjacent insulated piping. Owens Corning "Fiberglas Brand TIW, Type II".
 4. Closure System: Velcro, zipper or steel lacing. Steel lacing anchors shall have spindles and self-locking washers, fabricated of minimum 14 gauge stainless steel, with stainless steel wire ties. AGM Industries "Series NLA" (or approved). Closure shall be configured to allow for complete coverage and closure of the insulation around the object being insulated. Closure for cold surfaces (surfaces that operate below ambient air temperature) shall provide a sealed vapor barrier so that no surfaces are exposed to ambient air and so that no condensation can occur; overlap enclosure ends (or any vapor barrier penetrations, as caused by suing steel lacing anchors) with an added vapor barrier cover, minimum 2-inches past the vapor barrier penetration; with Velcro (or equivalent) closure.
- G. Corner Angles: 0.016 inch thick aluminum, alloy 3003 or 5005, with factory applied Kraft backing, complying with ASTM B 209.
- H. Equipment and Specialties Insulation Types and Thickness:
1. Unless a specific type of insulation is specified or noted, any of the insulation materials specified in this specification section may be used provided such application is in conformance with NCIS.

2. Insulation Thickness: Insulation thickness shall be the same as that specified for the piping or ductwork connected to the item, or as specified for the system the item is installed in (unless noted otherwise). Insulation thickness shall in no case be less than 1 inch thick.
3. Valves:
 - a. 2 Inches and Smaller: Insulate with same material as piping system.
 - b. 2-1/2 Inches and Larger: Removable blanket insulation.
4. Control Valves: Removable blanket insulation.
5. All equipment and specialties where access is required shall have removable insulation blankets; other removable insulation materials per NCIIS may be used where pre-approved by the Engineer. Items requiring such removable insulation include, but are not limited to, the following:
 - a. Strainers.
 - b. Balancing valves.

2.06 ACCESSORIES

- A. Adhesive, Caulks, Mastics, and Coatings: As recommended by insulation material manufacturer and suited for the application.
- B. Bands: 1/2-inch wide, of stainless steel, galvanized steel, or aluminum construction, to match with materials used with.
- C. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length shall be as required for insulation thickness used with. Welded pin holding capacity 100 lb, for direct pull perpendicular to the attached surface. Style and type to suit application.
- D. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness used with. Adhesive as recommended by the anchor pin manufacturer as appropriate for surface temperatures and materials used with, and to achieve a holding capacity of 100 lb for direct pull perpendicular to the adhered surface. Style and type to suit application.

PART 3 - EXECUTION

3.01 GENERAL

- A. Pre-Insulation Review: No covering materials shall be applied until systems to be covered have had all tests satisfactorily completed, have had all required inspections, and have been satisfactorily reviewed by the Architect-Engineer. All systems shall be examined by the Contractor to confirm cleanliness and other conditions are appropriate to allow for insulation installation.
- B. Insulation Work Review: No insulated items shall be concealed in the building structure or buried until the insulation work has been satisfactorily reviewed by the Architect-Engineer, and has had all required inspections.
- C. Standards: Materials shall be installed in accordance with manufacturer's written instructions, NCIIS, and shall comply with materials and methods specified herein. The more stringent requirements govern.
- D. Joints/Seams: Joints shall be staggered on multi layer insulation. Locate seams and joints in least visible location.

- E. Insulation Protection: Insulation shall be kept clean and dry and shall be protected from dirt, damage, and moisture. Insulation that becomes dirty, damaged, or wet and cannot be restored to like new condition will be rejected, and shall immediately be removed from the jobsite.
- F. Insulation Interruptions: Insulation shall be neatly finished at all supports, protrusions and interruptions. Provide adhesive and tape seal to maintain vapor barrier integrity.
- G. Equipment and Floor Protection: Cover existing equipment and finished floors to protect such items from insulation fiber and dust. Keep all such existing areas in a "broom clean" condition at the end of each day. Take precautions in these areas to prevent glass fiber and insulation dust from entering ventilation systems or areas adjacent to the work.
- H. Glass Fiber Insulation - General:
 - 1. Finish all insulation ends with joint sealing tape or vapor barrier mastic, no raw edges allowed.
 - 2. Joints: Tightly butt adjacent insulation sections together without any voids. Provide overlap of jacket material over all joints.
- I. Items To Be Insulated: Provide insulation on all ductwork, all piping, all items installed in these duct and piping systems, all air and liquid energy conveying systems and components, all air and liquid energy storage, all equipment, and all energy consuming devices, except where such insulation has been specifically excluded.
- J. Items Excluded From Being Insulated:
 - 1. Sanitary sewer drain lines (except traps at handicap accessible fixtures).
 - 2. Stops and risers at plumbing fixtures (except at handicap accessible fixtures).
 - 3. Factory insulated tanks.
 - 4. Relief Valves and associated drain piping.
 - 5. Hose bibbs (except where used as drains hot water systems).

3.02 DUCT INSULATION INSTALLATION

- A. Types and Thickness: Insulate all ducts with insulation type and thickness (to provide the required R value) as specified in "Part 2 - Products".
- B. General: Insulation shall be firmly butted at all joints. All longitudinal seams for flexible insulation shall overlap a minimum of 2 inches. All joints and seams shall be finished with appropriate joint sealing tape. Installation shall provide a continuous sealed vapor barrier over all surfaces; seal all jacket penetrations with vapor barrier mastic or vapor barrier jacket tape.
- C. Attachment: For rectangular ducts over 24 inches wide, duct insulation shall be additionally secured to the bottom of the ductwork with mechanical fasteners on 18 inch centers to reduce sagging. Washers shall be applied without compressing the insulation. Protruding ends or fasteners shall be cut off flush after washers are installed. All seams, joints, penetrations, and damage to the facing shall be sealed with joint sealing tape or vapor retardant mastic or appropriate joint sealing tape.

3.03 PIPE INSULATION INSTALLATION

- A. Types and Thickness: Insulate all piping with insulation type and thickness as specified in "Part 2 - Products". All piping shall be insulated except where specifically excluded.
- B. General: All ends shall be firmly butted together and secured with joint sealing tape. All jacket laps and joint sealing tape shall be secured with outward clinch staples at 4 inch spacing, or by use of a suitable adhesive. Installation shall provide a continuous sealed vapor barrier over all surfaces; seal all jacket penetrations with vapor barrier mastic or vapor barrier jacket tape.

- C. Elastomeric Pipe Insulation: Install with seams and joints sealed with rubberized contact adhesive. Insulation with pre-applied adhesive is not permitted. A brush coating of adhesive shall be applied to both butt ends to be joined and to both split surfaces to be sealed. Adhesive shall be allowed to set until dry to touch but tacky under slight pressure before joining the surfaces. Insulation seals at seams and joints shall not be capable of being pulled apart one hour after application. Provide added tape wrap around insulation to ensure seam and joint closure. Insulation that can be pulled apart one hour (or more) after adhesive installation shall be replaced. Provide metal jacketing over outdoor exposed insulation.
- D. Pipe Hangers: Provide insulation tight up to pre-insulated pipe supports at pipe hangers, seal all joints with joint sealing tape. Pre-insulated pipe supports are specified in Section 20 05 29.
- E. Pipe Sleeves: Run insulation continuous full size through sleeve. Coordinate work with fire seals and confirm fire seal system is approved for use with insulated pipes; see Section 20 05 30.
- F. Trench Insulation: Insulation shall be installed in strict compliance with manufacturer's instructions. Provide compacted backfill over insulation. Provide system anchors and guides to accommodate system expansion and contraction. Install pipe cushions at expansion loops and other bends to accommodate expansion and contraction.

3.04 EQUIPMENT AND SPECIALTIES INSTALLATION

- A. Types and Thickness: All equipment and items installed in insulated duct and piping systems shall be insulated except where specifically noted not to be; reference paragraph 3.01. Insulation type and thickness shall be as specified in "Part 2 - Products".
- B. General: Apply insulation as close as possible to equipment by grooving, scoring, and beveling as necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wires or bands. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. Comply with NCIS.
- C. Removable: All equipment and specialties where access is required for maintenance, repair, service, or cleaning shall have insulation installed so that it can be easily removed and reinstalled without being damaged and without requiring new insulation. Removable insulation shall completely cover the item being insulated with an overlap over adjacent insulation to cover all joints. Insulation on cold surfaces shall provide a sealed vapor barrier so that no surfaces are exposed to ambient air and so that no condensation can occur; overlap enclosure ends minimum 2-inches.
- D. ADA Compliant Lavatories and Sinks: Insulate P-trap and HW/CW supplies below lavatory and sink where exposed.
- E. Nameplates: Do not insulate over nameplates or ASME stamps; bevel and seal insulation around.
- F. Jacketing: Provide all equipment insulation with vapor retardant jackets.

END OF SECTION 20 07 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Commissioning of Mechanical Systems.
- B. Documentation.

1.03 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Qualifications: Submit qualifications of the firm proposed to perform the commissioning work and for the individuals that will be assigned.
- C. Commissioning Data:
 - 1. Commissioning plan.
 - 2. Commissioning preliminary report.
 - 3. Commissioning final report.

1.04 GENERAL REQUIREMENTS

- A. General: Commissioning shall be done by a Company which specializes in this work and independent and separate from the Companies installing the systems to be commissioned.
- B. Company Experience: The Company providing the commissioning work shall be experienced in commissioning HVAC control systems, and have commissioned at least five similar projects in the last three years. Company shall be certified for such work by AABC, NEBB, AEE or the BCA.
- C. Individual Experience: The individuals performing the commissioning work shall have at least five years experience in commissioning, with the individual in the field in charge or the work having commissioned at least five similar projects in the last three years.
- D. Deferred Test: Tests may be deferred to allow for proper climatic or other conditions.

1.05 REFERENCES

- A. AABC: Associated Air Balance Council.
- B. AEE: Association of Energy Engineers.
- C. BCA: Building Commissioning Association.
- D. NEBB: National Environmental Balancing Bureau.

PART 2 – PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 GENERAL

- A. General: Provide commissioning as required by code and as specified herein.
- B. Building Occupancy: Building or portions thereof, required by code to be commissioned, shall not be considered ready for occupancy until such time that the Engineer and building official determine that the preliminary commissioning report required by this Section has been completed.

3.02 NON-HVAC SYSTEMS

- A. General: All automatically controlled systems for which energy consumption, performance, or mode of operation are regulated by Code, shall be tested to ensure that control devices, equipment and systems are calibrated, adjusted and operate in accord with approved plans and specifications.
- B. Sequences: Sequences of operation shall be functionally tested to ensure they operate in accord with plans and specification.
- C. Service Water Heating: Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and sequence of operation, including under full-load, part-load and the following emergency conditions.
 - 1. Redundant or automatic back-up mode.
 - 2. Performance of alarms.
 - 3. Mode of operation upon a loss of power and restoration of power.
- D. Service Water Heating Controls: Service water heating controls shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with approved plans and specifications.

3.03 HVAC SYSTEMS

- A. General: HVAC equipment and HVAC control systems shall be tested to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved plans and specifications.
- B. Sequences: Sequences of operation shall be functionally tested to ensure they operate in accordance with approved plans and specifications.
- C. Conditions: Testing shall affirm operation during actual or simulated winter and summer design conditions and during full outside air conditions.
- D. HVAC Equipment: Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and sequence of operation, including under full-load, part-load and the following emergency conditions:
 - 1. All modes as described in the sequence of operation.
 - 2. Redundant or automatic back-up mode.

3. Performance of alarms.
 4. Mode of operation upon a loss of power and restoration of power.
- E. HVAC Controls: HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted, and operate in accordance with approved plans and specifications. Sequence of operation shall be functionally tested to document they operate in accordance with approved plans and specifications.
- F. Economizers: Air economizers shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

3.04 DOCUMENTATION

- A. Format:
1. Hard Copy: Provide reports in 8-1/2 x 11 format, in 3 ring notebooks, with labeled cover and spine, clean legible, and logically organized with table of contents, divider tabs, and names of companies involved in the project, commissioning company name, commissioning personnel, and contact information. Provide 3 copies per Divisions 00 and 01.
 2. Electronic: Provide copy in *.pdf format; submit with closeout documents per Divisions 00 and 01.
- B. Test Plan: Prepare a written commissioning test plan and submit for approval prior to beginning commissioning work. Test plan to include:
1. Equipment and systems to be tested.
 2. Roles and responsibilities of individuals performing the commissioning and of others involved in the project.
 3. Functional test procedures and forms.
 4. Conditions under which the test shall be performed (for example, winter design conditions, full outside air, etc.).
 5. Expected systems' response or acceptance criteria for each procedure.
 6. Time schedule for performance of the work; including any deferred tests.
 7. Forms as required by the WSEC or AHJ.
- C. Preliminary Commissioning Report:
1. General: A preliminary report shall be issued to identify issues preventing the commissioning work from being completed. If all commissioning work can be fully completed and the final report completed, a preliminary report is not required.
 2. Report: Compile all system and commissioning data; including all reviews, inspections, test procedures, and tests. Report shall include field notes of commissioning activities, equipment and system data, test procedures, tests performed, actual results as compared to expected (or specified) results, WSEC and any AHJ required commissioning forms (completed to the extent possible).
 3. Items to Complete: The preliminary report shall identify items needed in order to complete the commissioning, including:
 - a. Deficiencies found during testing required by this Section, which have not been corrected at the time of report preparation.
 - b. Deferred tests which cannot be performed at the time of report preparation due to climatic (or other) conditions.
 - c. Climate (or other) conditions required for performance of the deferred tests, and the anticipated date of each deferred test.
 - d. Proposed schedule for completion of report.

- D. Final Commissioning Report: Complete all commissioning work not previously completed and included in the preliminary report. Provide a complete final report with all systems and commissioning data; including test plan, all reviews, inspections, test procedures, tests, and results. Final report shall include all documentation required for the preliminary report and documentation regarding resolution of previous coted deficiencies.

END OF SECTION 20 08 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Sprinkler System Design.
- B. Piping.
- C. Sprinkler Heads.
- D. Accessories.
- E. Owner Instruction.

1.03 QUALITY ASSURANCE

- A. General: Comply with 20 05 00 requirements.
- B. Listing: All materials and equipment shall be UL listed and FM approved for the application.
- C. Latest Design: Products shall be of the manufacturer's latest design.
- D. Code and AHJ Compliance: Products and installation shall comply with code and Authority Having Jurisdiction (AHJ) requirements. Contractor is responsible to review and be familiar with code and local AHJ requirements. Products submitted are represented by the Contractor as complying with code and AHJ requirements.
- E. Exceed Code: The Contract Documents indicate items in excess of code requirements; in all such cases the work shall be done so that code requirements are exceeded as indicated. Such work may include coverage of areas not strictly required by code, painting, concealing of piping, access provisions for system inspections, oversized mains to accommodate future expansion, etc.

1.04 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Shop Drawings:
 - 1. Submit shop drawings of entire sprinkler system to Architect/Engineer for review; label these as "Preliminary – Not for AHJ Review". After incorporating or satisfactorily resolving Architect/Engineer review comments, submit shop drawings to AHJ for approval; label these as "AHJ Review Set"; at same time submit informational copy to the Architect/Engineer.
 - 2. Shop drawings shall show head locations on reflected ceiling plans; use shop drawings from ceiling installer for ceiling layout; where these drawings are not available use information in the Contract Documents to develop a reflected ceiling plans.
- C. Product Data: Submit information on all products to be used; include evidence of product UL listing and FM approval. Submit proposed labeling and signage.
- D. Calculations: Submit all system calculations showing compliance with NFPA and AHJ requirements.

- E. Review Impacts: Architect/Engineer's review may involve changes to Contractor's design in order to comply with the Contract Documents including aesthetic issues. These changes may be substantial enough to affect drawings and calculations submitted to the AHJ and requiring a resubmittal. Contractor shall assume at least one re-submittal to the AHJ will be required and shall pay all required AHJ re-submittal and AHJ re-review fees.

1.05 GENERAL REQUIREMENTS

- A. Experience: All fire sprinkler design shall be performed by a Contractor thoroughly familiar with and knowledgeable of NFPA 13, NFPA 24, local AHJ requirements, and fire sprinkler system design and installation. By virtue of submitting a bid, the Contractor is acknowledging that he does in fact have such knowledge; and all work provided will fully comply with all the requirements of these specifications. The fire sprinkler Contractor shall be qualified, as required by the AHJ to design and install all parts of the fire sprinkler system. All portions of underground fire sprinkler piping shall be installed by a licensed fire sprinkler contractor, or by a level U certified plumbing contractor, as issued by the State's Fire Marshal's office.
- B. Professional Stamp: All fire sprinkler design drawings and calculations shall be prepared by and stamped by a licensed fire sprinkler professional as required by the AHJ.
- C. Design: System shall be Contractor designed and approval by both the Fire Marshal and Architect/Engineer. System design shall comply with Contract Documents regarding particular system configuration as may be specified or noted (i.e. routing of mains, head locations, etc.).

1.06 REFERENCES

- A. AWWA C104: Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
- B. AWWA C111: Rubber - Gasket Joints for Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.
- C. AWWA C151: Ductile Iron Pipe, Centrifugally Cast for Water.
- D. FM-AG: FM Global Approval Guide.
- E. NFPA 13: Standard for the Installation of Sprinkler Systems.
- F. UL-FPD: Underwriters Laboratories Fire Protection Equipment Directory.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. General: All products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Pipe and Fittings: Domestic manufacturer's only.
- C. Valves: Ames, Febco, Watts, Crane, Grinnell, Potter-Roemer, Viking, Gem, Victaulic, Nibco, Stockham, and manufacturers listed for "Sprinkler System Components".
- D. Sprinkler System Components: Reliable, Viking, Potter-Roemer, Gem, Star, Victaulic, Tyco.

2.02 PIPE AND PIPE FITTINGS

- A. Aboveground Pipe and Fittings: Pipe shall be steel or copper; in accordance with NFPA 13. Fittings shall be suitable for 175 psi working pressure, and shall be cast iron or malleable iron screwed, grooved, welded, or soldered; in accordance with NFPA 13. Pipe and fittings shall have a CRR of 1.0 or better. Pipe and fittings ran outside and exposed to the outdoors shall be galvanized type. Flexible braided steel piping serving individual heads may be used where acceptable to the AHJ, and such piping is FM approved and UL listed for the application.
- B. Underground Pipe and Fittings: Ductile iron pipe conforming to AWWA C151, thickness class 52 minimum; in accordance with NFPA 24. Fittings shall conform to AWWA C111, with pressure rating no less than the water district main the piping is connected to; and in accordance with NFPA 24. Pipe and Fittings shall have cement-mortar lining conforming to AWWA C104, standard thickness. Pipe and fittings shall be restrained against movement in accordance with NFPA 24. Thrust restraining joints/fittings shall be UL listed for fire main use. Exception: Piping serving fire department connections may be galvanized steel pipe externally coated and wrapped as required by code.

2.03 SPRINKLER HEADS

- A. Wet Type - Finished Areas:
 - 1. Pendant: Shall be low profile, glass bulb type, with temperature rating to suit application and factory chrome plated finish. Where installed through ceiling, provide with escutcheons, two piece adjustable recessed type, with factory chrome plated finish to match sprinkler heads. Quick response type.
 - 2. Upright: Shall be glass bulb type, with temperature rating to suit application, and factory chrome plated finish. Quick response type.
 - 3. Sidewall: Shall be glass bulb or fusible solder type, with temperature rating to suit application, and factory chrome plated finish. Quick response type.
- B. Wet Type - Unfinished Areas: Link/lever type or glass-bulb type, with natural bronze or chrome plated finish, temperature rating to suit application. Quick response type.
- C. Dry Type:
 - 1. General: Provide where system may be exposed to freezing temperatures with finish, length and temperature rating to suit application. Quick response type.
 - 2. Finished Areas: Polished chrome finish type with flush type chrome plated escutcheon where installed through ceilings, soffits, and similar elements.
 - 3. Unfinished Areas: Natural bronze finish with flush or deep type brass finish escutcheon where installed through a floor, ceiling, or similar element.
- D. Sprinkler Guards: Hard-wire cage sprinkler guard, designed to protect sprinkler from mechanical damage, with chrome plated finish. Where used on exposed heads, guards shall be type that clamp to pipe; where used on recessed heads, guards shall be surface anchor type having substantial attachments to material surrounding the head (soffit plywood, etc.); provide 2x backing as needed. Provide custom fabricated guards/attachments as required.
- E. Sprinkler heads shall be upright, pendant or sidewall type as required to suit application.
- F. Extended Coverage Heads: Provide as necessary to allow complete coverage of all areas.

2.04 ACCESSORIES

- A. Sway Bracing/Restraints: Contractor fabricated of riser clamps, Schedule 40 pipe and pipe fittings, all welded construction, size and configuration to suit application.
- B. Hangers/Supports: See Section 20 05 29.
- C. Sleeves/Seals: See Section 20 05 30.
- D. Labeling:
 - 1. General: See Section 20 05 00 for labeling of piping, valves, equipment, concealed items, and similar items.
 - 2. Design Basis: Provide label identifying hydraulic basis of design and other design parameters, fabricated of material as required by the AHJ, with lettering type and information as required by the AHJ.
 - 3. Other: Provide additional labels as required by AHJ, fabricated of material as required by the AHJ, with lettering type and information as required by the AHJ.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Installation of all equipment shall be performed by a Contractor specializing in this work and subject to Owner and Fire Marshal approval. Install all items in accordance with code, manufacturers' recommendations, and best construction practices. Provide all system design, system features, fire sprinkler coverage, system support/anchorage, and documentation as specified herein and required by the AHJ.
- B. Pipe Routing:
 - 1. Select pipe routing that maintains full personnel access to building equipment and systems, without requiring stepping over or bending down to cross sprinkler piping. Follow specific pipe routing requirements of the Contract Documents as indicated. Piping shall run parallel to building structure in a neat, workmanlike manner.
 - 2. All piping shall be run concealed in ceiling space, attic space, pipe shafts, soffits, etc. where possible. Piping may only be exposed with Engineers approval and shall be painted as directed by the Architect/Engineer. Where piping must run exposed, it shall be ran in as unobtrusive fashion as possible, in lines parallel to major building features, as high as possible, and as directed by the Architect/Engineer.
 - 3. Provide all necessary drilling of beams, trusses, etc; reference Section 20 05 00 for cutting requirements; structural Engineers approval is required prior to any such cutting or drilling.
- C. Escutcheons: Provide chrome plated escutcheon plates at exposed pipe penetrations of all ceilings, floors and walls.
- D. Conflict Prevention:
 - 1. Review all building and system plans carefully and arrange the fire sprinkler work to avoid interferences and conflicts with other trades. Discuss and coordinate proposed sprinkler routing with other trades. The fire sprinkler system has the lowest priority of all building systems and is required to accommodate the space requirements of other systems.
 - 2. If piping routes are not properly coordinated with other trades and structures, rerouting and possible re-sizing will be required as directed by the Architect/Engineer. Offset, crossover and otherwise route piping to install system in available space.

- E. System Drainage: Special care shall be taken to ensure that entire sprinkler system is drainable in accordance with code. Provide drain valves as required (with labels) to allow for drainage; valves shall be concealed (with access doors) where possible; provide valves with provisions (male pipe nipple) for attaching temporary drain lines (where needed). Extend main drain(s) and 1 inch inspector's test connections to outside for drainage.
- F. Labeling: Provide labeling of items per Section 20 05 00. Provide additional labeling of items per AHJ requirements. All piping shall be labeled per Section 20 05 00.
- G. Sprinkler Heads: Heads shall be centered in ceiling panels. Where "scored" ceiling panels are used, heads shall be located to be centered in the flat portion of the tile between "scores".
- H. Head Protection: Provide wire cage protectors for heads susceptible to damage (this includes all heads in mechanical loft areas with sprinkler heads 7 feet or less above walking surface, all gym heads, outside soffit heads below 9 feet, and similar areas).
- I. Hangers and Supports: Shall comply with NFPA 13 and Section 20 05 29. See also structural drawings for added limitations/requirements of supports and attachments to structure.

3.02 SYSTEM DESIGN

- A. General: System shall be Contractor designed in accordance with NFPA 13, AHJ requirements, and additional requirements as cited in the Contract Documents. Design shall be based on designated occupancy, storage configurations, commodity types, and related parameters. Design with provisions for forward flow testing of backflow prevention devices. Where insufficient data is available request clarification prior to bidding.
- B. Hydraulically Designed:
 - 1. General: Base system design on hydraulic calculations in accordance with recognized engineering practices and standards, acceptable to the AHJ and Engineer. Calculations shall use approved water flow test data on the water supply main serving the fire protection system. Such test data must meet the approval of the AHJ and the Engineer.
 - 2. Preliminary Water Flow Data: Any water flow data indicated on the drawings is preliminary only. Where no data is indicated then no data has been provided to the Engineer; the Contractor shall obtain water flow data from other sources. In all cases a factor shall be added to account for the use of preliminary data and that updated flow data may be different; such factor shall allow for at least a 10% flow reduction and 10% pressure reduction.
 - 3. Updated Water Flow Data: Obtain updated water flow data (including new water tests) and pay all associated test fees or charges. Design and calculations shall include complete system, including water main to building, and extending as far back into the local utility systems (i.e. to reservoirs, tanks, etc.) as deemed necessary by the AHJ.

3.03 TESTING

- A. Testing: The systems shall be hydrostatically and operationally tested in accordance with the requirements of NFPA 13 and the AHJ. Any changes required to meet time or flow test requirements shall be made without additional cost to the Owner. Certificates of acceptance shall be submitted to the Architect/Engineer.

3.04 OPERATING AND OWNER INSTRUCTIONS

- A. Typed Instructions: Typewritten, plastic covered, framed operational and maintenance instructions shall be mounted in the building(s) near each fire sprinkler riser. Information shall clearly indicate portion of the building covered by the system, type of system, location of sub-risers, locations of system drains, when system was placed into service, installed, installers name (company) and contact information for service, how to close and open system main valve, and other pertinent operational instructions. Provide reference to O&M manuals provided to the Owner for additional operation and maintenance instructions.
- B. O&M Manual: See Division 01 and Division 20.
- C. Owner Instructions: The Owner or his representative shall be instructed by the Sprinkler Contractor in the operation of the system. The instruction shall be given by Contractor's personnel who are considered qualified in the opinion of the Architect/Engineer and shall be for a minimum of two hours. Instruction shall include location of all valves, drains, and pipe routing, as well as proper maintenance and testing procedures.

END OF SECTION 21 10 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Domestic Water Piping.
- B. Valves.
- C. Water Hammer Arrestors.
- D. Trap Primers.
- E. Water Service Connections.
- F. Testing and Inspection.
- G. Flushing and Disinfection.

1.03 DEFINITIONS

- A. "Lead-Free" means not containing more than 0.2% lead in solder and flux; and not more than a weighted average of 0.25% lead in wetted surfaces of pipes, pipe and plumbing fittings and fixtures.

1.04 SUBMITTALS

- A. General: Submittals shall comply with Section 20 05 00.
- B. Product Data: Submit manufacturer's product information on all items to be used.
- C. System Tests and Inspections: Submit documentation showing systems have satisfactorily passed all pressure tests and code inspections.
- D. Cleaning and Disinfection: Submit documentation regarding completion of flushing, disinfection, bacteriological tests, and Health Department's acceptance of tests and system.

1.05 GENERAL REQUIREMENTS

- A. ANSI/NSF Compliance: All items in contact with potable water shall be lead free in accordance with ANSI/NSF 61. Plastic piping system components shall comply with ANSI/NSF 14. Only lead-free solder shall be used.
- B. Valves: Shall be dezincification resistant, and shall not contain more than 15% zinc in their chemical composition.

1.06 REFERENCES

- A. ASME B16.3: Malleable Iron Threaded Fittings.
- B. ASME B16.15: Cast Bronze Threaded Fittings: Classes 125 and 250.
- C. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- E. ASME B16.24: Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 400, 600, 900, 1500, and 2500.

- F. ASTM A53: Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
- G. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. ASTM A312: Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- I. ASTM A403: Wrought Austenitic Stainless Steel Piping Fittings.
- J. ASTM A530: General Requirements for Specialized Carbon and Alloy Steel Pipe.
- K. ASTM A774: As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
- L. ASTM A 778: Welded, Un-annealed Austenitic Stainless Steel Tubular Products.
- M. ASTM B16.18: Seamless Copper Water Tube.
- N. ASTM B32: Solder Metal.
- O. ASTM D1784: Chlorinated Poly (Vinyl Chloride) CPVC Compounds.
- P. ASTM F437: Threaded Chlorinated Poly (Vinyl Chloride) CPVC Plastic Pipe Fittings, Schedule 80.
- Q. ASTM F439: Socket-Type Chlorinated Poly (Vinyl Chloride) CPVC Plastic Pipe Fitting.
- R. ASTM F441: Chlorinated Poly (Vinyl Chloride) CPVC Plastic Pipe.
- S. ASTM F493: Solvent Cement for Chlorinated Poly (Vinyl Chloride) CPVC Pipe and Fittings.
- T. ASTM F876: Standard Specification for Cross-linked Polyethylene (PEX) Tubing.
- U. ASTM F877: Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems.
- V. ASTM F1960: Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.
- W. AWS A5.8: Filler Metals for Brazing and Braze Welding.
- X. AWWA B300: Hypochlorites.
- Y. AWWA B301: Liquid Chlorine.
- Z. AWWA M20: Water Chlorination and Chlorination Practices and Principles, 2nd edition.
- AA. ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials.
- BB. ANSI/NSF Standard 61 Drinking Water System Components – Health Effects.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, 2.01, Acceptable Manufacturers.
- B. Pipe and Fittings: Domestic Manufacturers only.
- C. Press-Fit Fittings: Nibco, Viega.
- D. Valves: Conbraco/Apollo, Nibco, Stockham, Walworth, Milwaukee, Kitz, Red-White, Watts, Hammond.
- E. Balancing Valves: Bell & Gossett, Taco, Armstrong, Red-White.
- F. Additional manufacturers are as listed for each individual item.

2.02 PIPE AND FITTINGS - MATERIALS

A. Copper Pipe and Fittings:

1. Pipe: Seamless copper water tube, hard temper (unless noted otherwise), type K or L as indicated, per ASTM B88.
2. Fittings:
 - a. Solder-Joint: Wrought copper and bronze fittings per ASME B 16.22 and cast copper alloy fittings per ASME B16.18, cast bronze threaded fittings per ASME B16.15.
 - b. Flanged: Cast bronze fittings per ASME B16.24.
 - c. Solder Material: 95/5 tin-antimony solder per ASTM B32 or "Silvabrite 100" (95.5 tin/4 copper/0.5 silver) solder; lead free.
 - d. Brazing Material: AWS A5.8, BCuP-5.
 - e. Press-Fit Fittings.

B. Galvanized Steel Pipe and Fittings:

1. Pipe: Seamless hot-dip galvanized steel pipe, per ASTM A 53, Type E, Grade B. Schedule 40 unless indicated otherwise.
2. Fittings: Galvanized, malleable-iron, threaded, per ASME B16.3.

C. Stainless Steel Pipe and Fittings:

1. Pipe: Seamless or welded stainless steel per ASTM A778 or A312, type 304L or 316L, tolerances per ASTM A 530. Schedule 40 unless indicated otherwise.
2. Fittings:
 - a. Threaded: Constructed of same material as piping, per ASTM A774 or A403, suitable for 150 psi swp.
 - b. Welded: Constructed of same material as piping, weld fittings, per ASTM A774 or A403, suitable for 150 psi swp.
 - c. Flanged: Constructed of same material as piping, 150 pound class.

2.03 PIPE AND FITTINGS - APPLICATIONS

- A. Domestic Water Piping - Above Ground: Type L or K copper with flanged, soldered, or press-fit joints or stainless steel; except where run exposed in finished areas shall be stainless steel, or be chrome plated copper, or be copper piping with a chrome plated sleeve.
- B. Domestic Water Piping - Below Ground: Type K copper tubing with silver brazed joints; except that piping within the building footprint serving individual fixtures may be type L (soft or hard temper) copper.
- C. Trap Primer Piping: Type L or K "soft" or "hard" (bending temper) copper, with compression fittings or soldered joints.

2.04 VALVES

A. Ball Valves:

1. 2 Inches and Smaller: 600 psi non-shock cold working pressure, 100 psi at 300 deg F, bronze body, full port, 2 piece construction, anti-blowout stem, reinforced PTFE seats, stainless steel or chrome plated brass or silicon bronze ball, lever handle, solder or threaded connections. Provide with extended lever handle where valve is installed in systems with insulation thickness greater than 0.5 inch. Nibco S-585-66-LF, T-585-66-LF, Nibco S-585-80-LF, T-585-80-LF (or approved).

B. Check Valves:

1. 2 Inches and Smaller:

- a. Horizontal: 125 psi-swp bronze body horizontal swing check valve, regarding type, y-pattern, renewable seat and disc, solder or threaded connection. Nibco S-413-LF or T-413-LF (or approved).
- b. Vertical: 125 psi-swp bronze body vertical inline check valve, stainless steel or bronze disk holder, Buna-N disk, stainless steel spring actuated, solder or threaded connection. Nibco S-480-LF or T-480-LF (or approved).

2. 2-1/2 Inches and Larger:

- a. Horizontal: 125 psi-swp iron body vertical inline "silent" check valve, wafer or flanged style, renewable seat and disk, stainless spring actuated, bronze disk. Nibco W-910 (or approved).
- b. Vertical: 125 psi-swp iron body vertical inline "silent" check valve, wafer or flanged style, renewable seat and disk, stainless spring actuated, bronze disk. Nibco W-910, F-910 (or approved).

C. Balancing Valves: Calibrated balance valve, ball or globe type, bronze body, with brass readout valves with integral EPT insert and check valve to minimize fluid loss during balancing. Valve shall have calibrated nameplate and memory stop. Rated for 200 psig working pressure at 250 degrees F. Valve shall be same size as pipe installed in. Bell & Gossett "Circuit Setter" (or approved).

D. Drain Valves: Bronze ball valve, minimum 125 psi-swp, anti-blowout stem, stainless steel or chrome plated brass ball, reinforced TFE seat, solder or threaded inlet connection, male 3/4 inch hose thread outlet connection, with brass cap and chain. Nibco S-585-70-HC, T-585-70-HC (or approved).

2.05 ACCESSORIES

A. Water Hammer Arrestors: All metal, factory pre-charged with inert gas, sealed internal bellows; 125 psi working pressure. All wetted parts shall be type 300 stainless steel, brass or copper. PDI (Plumbing and Drainage Institute) sizes as indicated. Where not sized, provide sizes in accordance with PDI standards. Zurn "Shoktrol", Wade "Shokstop", or J. R. Smith "Hydrotrol".

B. Trap Primer Valve:

1. Pressure Drop Type: Adjustable, activated by drop-in water pressure. Constructed of corrosion resistant brass with integral backflow preventor, vacuum breaker ports, distribution manifold to suit number of drains served, adjustable to line pressure for water delivery. Precision Plumbing Products Model P-1 and P-2 (or approved).

PART 3 - EXECUTION

3.01 GENERAL

A. Workmanship:

1. Installation of all items shall comply with code, best professional practices, manufacturers written installation instructions, and to allow for proper functioning of items being connected to.
2. Install all piping parallel to the closest wall and in a neat, workmanlike manner. Horizontal exposed straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.

3. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary.
- B. Complete System: Provide all piping as indicated and as required to allow supply connections to each fixture and equipment item requiring water supply. Provide offsets as required to accommodate building construction and access requirements per Section 20 05 00. For multistory buildings include costs to offset vertical piping at each floor level since structural member locations will not be the same on each floor.
- C. Coordination: Coordinate installation of items with all trades that are affected by the work to avoid conflicts.
- D. Expansion and Contraction: Install piping to accommodate system expansion and contraction; provide necessary offsets, expansion devices, anchors, guides and related accessories. See Section 20 05 29.
- E. Openings for Piping: See Section 20 05 30 for sleeves and seals; provide openings in building construction sized to accommodate required sleeve size. Where sleeves are not required provide openings sized as follows:
 1. Belowground Penetrations: Inside diameter of opening shall be at least 2-inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), and so as to allow free movement of piping.
 2. Aboveground Penetrations: Inside diameter of opening shall be at least 1-inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), and so as to allow free movement of piping.
 3. Large Movement: Provide larger sleeves where a larger space around pipe exterior is required by code, where specifically noted, where pipe movement will occur (i.e. expansion/contraction or seismic), at expansive soils, other unusual conditions are present, and where required to accommodate large piping movement.
- F. Hot Water Adjustment: Adjust the hot water circulation system for uniform circulation throughout the system; provide balancing of system where hot water circulation system has multiple branches with balancing valves (see balancing specification Section). Install, set, and adjust all system components for proper operation.

3.02 PIPE AND FITTINGS

- A. Concealed: All piping in finished areas shall be installed concealed unless specifically noted otherwise. Provide escutcheons where piping is allowed to be exposed and pipe passes through building elements (i.e. walls, floors, ceilings, etc.).
- B. Non-Obstructing: Install piping at such heights and in such a manner so as not to obstruct any portion of windows doorways, passageways, or access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur.
- C. Drawing Review: Consult all drawings for location of pipe spaces, ducts, electrical equipment, ceiling heights, door openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.
- D. Insulation: Allow sufficient clearances for installation of pipe insulation in thickness specified. If interferences occur, reroute piping to accommodate insulation.
- E. Drainage: Slope all piping to low points to allow the system to be drained. Provide added drain valves where system cannot be drained through fixtures.

- F. Preparation for Joining: Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.
- G. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).
- H. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.
- I. Unions: Install unions in pipe connections to valves, coils, and any other equipment where it may be necessary to disconnect the equipment or piping for repairs or maintenance; and as indicated. Where flanged connections occur at equipment additional unions are not required unless indicated otherwise.
- J. Insulating Unions: Install dielectric insulating connectors between all connections of copper piping and steel piping of steel equipment. Where flanged connections occur use insulating type flanges.

3.03 VALVES

- A. Type: Ball type only.
- B. General: Provide isolation valves as shown on the drawings. In addition to those shown, provide added valves to allow for the isolation of each group of fixtures, and all individual equipment items (e.g. dishwashers, heat exchangers, etc.).
- C. Installation: Install valves so as to be easily accessible and oriented to permit ease of operation. Valve stem shall be directed toward operator in either the vertical or horizontal direction. Provide access doors for valves not otherwise accessible.
- D. Drain Valves: Provide drain valves at the base of all risers (except not required where risers can be drained through plumbing fixtures or equipment drains). Provide drain valves at piping low points where the piping cannot be drained through fixtures, hose bibs, or equipment drains.
- E. Balancing Valves: Provide balancing valves in hot water circulation piping where indicated and where required to allow for equal distribution of hot water circulation flows.

3.04 ACCESSORIES

- A. Water Hammer Arrestors: Install per manufacturer's instructions, just upstream of last fixture on branch line. Provide water hammer arrestors on branch water lines serving fixtures with flush valves, washer machines, solenoid valves, and similar quick-acting valves. Water hammer arrestors are typically not shown on the plans, but shall be provided per this paragraph. Provide ball isolation valve in piping to arrestor. Where access cannot be provided at water line location, the water hammer arrestor piping may be extended vertically and the water hammer arrestor located above ceiling outside of plumbing chase.
- B. Trap Primers: Provide trap primers to all vented floor drains, floor receptors, and where required by the code. Install with an isolation valve in the branch line to the trap primer valve.
- C. Access Doors: Provide access doors to all valves, water hammer arrestors, trap primers, backflow preventers, and any other piping accessories which would otherwise be inaccessible. See Section 20 05 19 for access door specifications.

3.05 TESTING AND INSPECTION

- A. All piping shall be tested, inspected, and approved by the local authority having jurisdiction prior to being concealed or covered.

- B. Testing shall be witnessed by the plumbing inspector and the Architect/Engineer (at his option). Notify Architect/Engineer minimum 72 hours prior to date of testing, and mutually agreed upon times arranged.
- C. Piping shall be hydrostatically tested for a period of 2 hours (or as required by local authority having jurisdiction), during which time no drop in pressure or leakage shall occur.
- D. Test pressure shall be not less than 150 percent of the maximum to which the pipe will ordinarily be subjected; but in no case less than 75 psig.
- E. Any leaks or defective piping disclosed by testing and inspection shall be repaired with new materials and the system re-tested.
- F. Provide documentation to the Engineer indicating that the system has been completely pressure tested, and all portions inspected and accepted by the local authority having jurisdiction.

3.06 FLUSHING AND DISINFECTION

- A. System Flushing: After tests are completed, all water piping shall be flushed. In general, sufficient water shall be used to produce a minimum water velocity of 2.5 feet per second through piping being flushed. Flushing shall be continued until discharge water shows no discoloration. System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced in line. System valves and fixture faucets shall be opened and re-closed to completely flush system. After flushing and cleaning, systems shall be prepared for disinfection service by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building during this process shall be repaired by the Contractor.
- B. Disinfection:
 - 1. Upon completion of the job and prior to final acceptance, the plumbing system shall be disinfected with Chlorine solution. Review procedures and disinfection with the authority having jurisdiction to insure that all work complies with code requirements. Verify any deviations from specified procedures with the Architect/Engineer prior to proceeding. The chlorinating material shall be either liquid chlorine conforming to AWWA B301 or hypochlorite conforming to AWWA B300 (or as otherwise required by the authority having jurisdiction). Water chlorination procedure shall be in accordance with AWWA M20 (or procedure acceptable to AHJ and to the Architect/Engineer). The chlorinating material shall provide a dosage of not less than 50 parts per million and shall be introduced into the system in an approved manner. The treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria.
 - 2. The retention time shall be at least 24 hours and shall produce not less than 10 ppm of chlorine at the extreme end of the system at the end of the retention period. All valves in the system being sterilized shall be opened and closed several times during the contact period. The system shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period all valves and faucets shall be opened and closed several times.
- C. Bacteriological Tests: The Contractor shall employ an approved agency to take test samples at several points of the system (i.e. end of each wing, each floor of building, etc.) in properly sterilized containers and arrange with the Health Department (or a test agency acceptable to the Health Department) having jurisdiction to test the samples. Test for coliform and other items as required by the AHJ. Should the samples not test satisfactory, the system shall be re-flushed and disinfected again until satisfactory samples are obtained.

- D. Submittal: Submit documentation stating that flushing and disinfection has been completed, copies of the bacteriological test results, and certification from the Health Department having jurisdiction stating that system has been found acceptable.

END OF SECTION 22 11 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Soil, Waste and Vent Piping.
- B. Condensate, Overflow, Miscellaneous Drains.
- C. Cleanouts.
- D. Testing and Inspection.
- E. Accessories.

1.03 SUBMITTALS

- A. General: Submittals shall comply with Section 20 05 00.
- B. Product Data: Submit product information on all items to be used.

1.04 REFERENCES

- A. ASME B 16.4: Gray Iron Threaded Fittings.
- B. ASME B 16.12: Cast Iron Threaded Drainage Fittings.
- C. ASME B 16.15: Cast Bronze Threaded Fitting Classes 125 and 250.
- D. ASME B 16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
- E. ASME B 16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- F. ASME B 16.23: Cast Copper Alloy Solder Drainage Fittings.
- G. ASME B 16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV).
- H. ASTM A 53: Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- I. ASTM A 74: Cast Iron Soil Pipe and Fittings.
- J. ASTM A 888: Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- K. ASTM B 32: Solder Metal.
- L. ASTM B 88: Seamless Copper Water Tube.
- M. ASTM B 306: Copper Drainage Tube (DWV).
- N. ASTM C 564: Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- O. ASTM C 1277: Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.
- P. ASTM D 1785: Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- Q. ASTM D 2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

- R. ASTM D 2447: Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
- S. ASTM D 2466: Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- T. ASTM D 2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- U. ASTM D 2657: Heat Fusion Joining or Polyolefin Pipe and Fittings.
- V. ASTM D 2665: Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- W. ASTM D 2843: Density of Smoke from the Burning or Decomposition of Plastics.
- X. ASTM D 3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- Y. ASTM D 3212: Joints for Drains and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- Z. ASTM D 3311: Drain, Waste, and Vent (DWV) Plastic Fittings Patterns.
- AA. ASTM D 4101: Polypropylene Injection and Extrusion Materials.
- BB. ASTM F 477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- CC. ASTM F 1412: Polyolefin Pipe and Fittings for Corrosive Waste Drainage Systems.
- DD. AWWA C509: Resilient-Seated Gate Valves for Water Supply Service.
- EE. AWWA C515: Standard for Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
- FF. CISPI 301: Hubless Iron Soil Pipe and Fittings for Sanitary and Drain, Waste, and Vent Piping Applications.
- GG. CISPI 310: Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, 2.01, Acceptable Manufacturers.
- B. Pipe and Fittings: Domestic Manufacturers only.
- C. Pipe and Fittings - Acid Resistant Applications: Enfield, Orion, Georg Fisher.
- D. No Hub Couplings: ANACO, Mission Rubber, Tyler, MG Coupling, Fernco, Clamp-All, Mifab. Ideal-Tridon.
- E. Cleanouts: Josam, Zurn, J.R. Smith, Wade.

2.02 PIPE AND FITTINGS - MATERIALS

- A. No-Hub Cast Iron Pipe and Fittings:
 - 1. Pipe and Fittings: Service weight no-hub cast iron pipe and cast iron fittings, per CISPI 301 and ASTM A 888, for use with mechanical no-hub couplings. Pipe and fittings shall be marked with the Cast Iron Soil Pipe Institute trademark and be NSF listed.
 - 2. Couplings: Per CISPI 310 or ASTM C 1277, with a cast iron or stainless shield, and neoprene gasket per ASTM C 564.
- B. Hub and Spigot Cast Iron Pipe and Fittings: Service weight hub and spigot cast iron pipe and cast iron fittings per ASTM A 74, for use with compression gaskets. Gaskets shall conform to ASTM C 564.

- C. Copper DWV Pipe and Fittings: Copper drainage tube per ASTM B 306. Wrought copper and wrought copper alloy solder joint fittings per ASME B 16.29; or cast copper alloy solder joint fittings per ASME B 16.23.
- D. Galvanized Steel DWV Pipe and Fittings: Schedule 40 galvanized steel pipe per ASTM A 53, Grade B, Type 5. Cast iron drainage fittings, threaded, per ASME B 16.12; and cast iron screwed fittings per ASME B 16.4.
- E. Copper Pipe and Fittings: Seamless copper water tube, tube L or M, per ASTM B 88. Solder joint wrought copper and bronze fittings per ASME B 16.22 cast copper alloy fittings per ASME B 16.18, and cast bronze threaded fittings per ASME B 16.15 with 95/5 tin-antimony solder per ASTM B 32.

2.03 PIPE AND FITTINGS – APPLICATION

- A. Waste and Vent:
 - 1. Piping 2-1/2 Inches and Smaller Located Above Ground: Galvanized steel DWV, no-hub cast iron, copper DWV.
 - 2. Piping 3 Inches and Larger Located Above Ground, and All Piping Located Below Ground: No-hub cast iron, bell and spigot cast iron, copper DWV.
 - 3. No-Hub Couplings: Couplings on below ground piping shall be the heavy duty type.
- B. Miscellaneous Drains: Copper DWV, copper, PVC DWV, or PVC; except that for corrosive fluids (or corrosive fluid venting) applications use the same materials as specified for the acid waste (or vent) systems, or use PVC.
- C. Piping Exposed in Finished Areas: Chrome or nickel plated brass; piping 2 inches and larger may be provided with chrome or nickel plated brass sleeves to conceal pipe and fittings.

2.04 CLEANOUTS

- A. General:
 - 1. All cleanouts shall have cast iron bodies with bronze countersunk rectangular slotted plugs, lubricated with a non-hardening teflon base thread lubricant and having a gasket seal.
 - 2. Cleanouts located in waterproof membrane floors shall be provided with an integral cast flange and flashing device.
 - 3. All cleanouts shall be the same size as the pipe which they are intended to serve (but not larger than 4-inch).
 - 4. Pipe fittings for cleanouts which turn through walls or up through floors shall use long sweep ells or a "Y" and 1/8 bend.
 - 5. All cleanouts and access covers shall be provided with vandal proof screws.
- B. Floor Cleanouts:
 - 1. Areas With Floor Tile (or Linoleum): J.R. Smith No. 4140 Series adjustable floor cleanout with round heavy duty nickel bronze top with tile recess.
 - 2. Areas With Bare Concrete Floors: J.R. Smith No. 4100 Series adjustable floor cleanout with round heavy duty nickel bronze top.
 - 3. Areas With Terrazzo (and Similar Poured Floors): J.R. Smith No. 4180 Series adjustable floor level cleanout with round heavy duty nickel bronze top with terrazzo recess.
 - 4. Areas With Carpet: J.R. Smith 4020-X Series adjustable floor level cleanout with round heavy duty nickel bronze top and carpet clamp.
- C. Wall Cleanouts: Cast iron ferrule with cast bronze taper threaded plug, with plug tapped 1/4-inch, 20 thread, to accept access cover screw; with stainless steel access cover and vandal proof screw.

- D. Outside Cleanouts: Heavy duty, round, cast iron, double-flanged housing, having scoriated cast iron cover with lifting device, ferrule and bronze closure plug. Housing and lid shall be galvanized and have vandal resistant screws. J.R. Smith No. 4251 or 4256 Series.

PART 3 - EXECUTION

3.01 GENERAL

- A. Installation of all items shall comply with code, best professional practices, manufacturers written installation instructions, and to allow for proper functioning of items being connected to.
- B. Provide all piping as indicated and as required to allow complete and proper waste, drain, and vent connections to each fixture and equipment item requiring connection. Provide offsets as required to accommodate building construction and access requirements per Section 20 05 00. For multistory buildings include costs to offset vertical piping through each floor level since structural member locations will not be the same on each floor.
- C. Coordinate installation of items with all trades that are affected by the work to avoid conflicts.
- D. The work of this section shall include all waste (sanitary sewer), drain, and vent lines inside of the building and 5-feet outside of the building (unless indicated otherwise), to the point of and including connections to outside sanitary sewer lines or sanitary sewer manholes.
- E. Consult manufacturers data and architectural drawings for information on plumbing fixtures before beginning rough-in.
- F. Verify points of connection, invert elevations, and grade requirements before beginning installation or ordering materials.
- G. Stub all piping for all items requiring connections through wall or floor; cap and protect until connection to items is complete.
- H. Vents extending through roof shall terminate at least 10 inches above roofing; and not less than 10 feet from and 3 feet above any building opening. Provide vent flashing at each vent through roof; utilize water-proof method as required to best suit roofing material and roofing system manufacturer.
- I. Trap all fixtures and equipment items as required by governing code; provide proper venting for each trap.
- J. Provide drain piping for all drip pans, unit condensate drains, unit P-traps, etc. Run piping to nearest point of drainage, or as shown on drawings. Where routing is not shown, route to nearest point of proper drainage.
- K. Provide piping connections to equipment furnished by others in accordance with Section 20 05 00.
- L. All excavation, trenching and backfilling shall comply with code and pipe manufacturers recommendations.

3.02 PIPE AND FITTINGS

- A. All piping in finished areas shall be installed concealed unless specifically noted otherwise.
- B. Install piping so as not to obstruct access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur. Prior to running any piping, confirm with Architect/Engineer (unless is clearly noted to be ran exposed). Install exposed piping so as not to obstruct any portion of windows, doors, doorways, passageways, or items requiring service or access.
- C. Consult all drawings for location of pipe spaces, ducts, electrical equipment, structural elements, ceiling heights, door items requiring access, openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.
- D. Install all horizontal soil or waste lines with a slope of 1/4-inch per foot unless noted otherwise. Coordinate with AHJ if written approval is required for exceptions to 1/4-inch per foot slope.
- E. Make all changes of direction and junctions with Y fittings and 1/8 bends; use sanitary tee fittings in vertical pipe only.
- F. Provide escutcheons where exposed pipe passes through walls, floors, or ceilings.
- G. Install all piping parallel to the closest wall and in a neat, workmanlike manner. Horizontal straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.
- H. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary. Such offsets are typically not shown on the plans, but are required per this paragraph.
- I. Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.
- J. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).
- K. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.
- L. PVC and ABS Pipe:
 - 1. Solvent Joints: The outside of the PVC pipe shall be chamfered to a minimum of 1/16-inch at approximately 22 degrees. Chemicals used must penetrate the surface of both pipe and fitting which will result in complete fusion at the joint. Use solvent and cement only as recommended by the pipe manufacturer.
 - 2. Plastic to Metal Connections: Work the metal connection first. Use a non-hardening compound on threaded connections. Use only light wrench pressure. Connections between metal and plastic are to be threaded utilizing female threaded adapters only, not male adapters.
 - 3. Expansion/Contraction: Provide offsets and expansion couplings to accommodate system expansion/contraction and for changes in building due to building shrinkage or other shifts. For wood framed construction of four stories or more; provide expansion couplings at each floor in waste and vent pipe risers.

3.03 INSTALLATION OF CLEANOUTS

- A. General: Install cleanouts in all soil and waste piping:
 - 1. As shown on drawings.
 - 2. At no more than 100 foot intervals on horizontal runs (whether shown on drawings or not).
 - 3. At the end of all piping runs.
 - 4. At the base of all vertical risers.
 - 5. At all changes of direction for a run of 10 feet or over.
 - 6. Where needed to correct possible stoppage.
 - 7. As required by Code.
- B. Elevations:
 - 1. Floor cleanouts shall be installed so as to be flush with the finished floor; where recessed cleanout covers are used the recess shall be filled flush with material to match the surrounding finished floor.
 - 2. Wall cleanouts in finished areas shall all be installed at the same height for a uniform appearance throughout the facility. Heights shall be selected so as not to interfere with base molding or other trim work; verify with other trades.
- C. Clearances and Access: Install cleanouts so as to assure proper clearances as required by governing code. Where cleanouts occur in concealed spaces provide extensions to floors above or to walls to allow access. Provide wall access covers or access doors for all wall cleanouts. See Section 20 05 19 for access doors.

3.04 TESTING AND INSPECTION

- A. All piping shall be tested, inspected and approved prior to being concealed or covered.
- B. Testing shall be by water or air, and comply with code.
- C. Testing shall be witnessed by the code official, the Owner's representative (at their option), and the Engineer (at their option). Prior to beginning testing confirm with the Owner and Engineer their level of involvement in the testing process and extent of witnessing; where they will be witnessing the testing notify them at least 72 hours in advance of the test and confirm their availability; coordinate and reschedule as necessary and arrange mutually agreed upon times for the tests and witnessing to occur.
- D. Water Testing:
 - 1. Fill system with water so that there is no less than 10 feet of head above the highest system section being tested.
 - 2. System shall hold pressure for a period of at least 15 minutes with no leakage before the inspection starts.
 - 3. The system shall be inspected and shall hold tight with no leakage at all points.
- E. Air Testing:
 - 1. Pressurize system with air so that there is no less than 5 psig of air pressure in the system.
 - 2. System shall hold pressure for a period of at least 15 minutes without the introduction of additional air before the inspection starts.
 - 3. The system shall be inspected and shall hold tight with no leakage at all points.

- F. All leaks shall be eliminated and the system re-tested before proceeding with work or concealing pipe.
- G. All repairs to piping shall be with new material and no caulking of screwed joints or holes is allowed.

END OF SECTION 22 13 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Plumbing Fixtures and Trim.
- B. Installation/Connection of Equipment Specified Elsewhere.
- C. Adjustment and Cleaning.

1.03 DEFINITIONS

- A. "Plumbing Brass" means "P-traps, stops, strainers, tailpieces, flanges, and other brass fittings and accessories NOT including faucets or stops."
- B. "Trim" includes all plumbing brass items, faucets, and any fixture accessories.
- C. "Accessible" refers to the American's with Disabilities Act, and infers that these fixtures will meet Federal and local code requirements.
- D. "Lead-Free" means not containing more than 0.2% lead in solder and flux; and not more than a weighted average of 0.25% lead in wetted surfaces of pipes, pipe and plumbing fittings and fixtures.

1.04 REFERENCES

- A. UPC: Uniform Plumbing Code.
- B. NSF/ANSI Standard 61: Drinking Water System Components – Health Effects.

1.05 SUBMITTALS

- A. General: All submittals shall comply with Section 20 05 00.
- B. Product Data: Submit product data for all plumbing fixtures, plumbing trim, and water heaters.

1.06 GENERAL REQUIREMENTS

- A. Fixture Quality: Provide new fixtures and fittings, approved, free from flaws and blemishes with finished surfaces clear, smooth and bright. Visible parts of fixture brass and accessories, and all items located in accessible cabinet spaces, shall be heavily chrome plated. All stops, P-traps and items exposed to view shall be chrome plated (except where specifically noted otherwise).
- B. Code Compliance: All products and connections shall be in compliance with code, local Utilities Department standards, and Health Department requirements.
- C. Off-The-Floor Mounted Fixtures - Movement:
 - 1. General: Off-the-floor (i.e. wall) mounted fixtures shall be supported, anchored, and braced in a manner so that the fixture does not move more than the values indicated below with the imposed forces as indicated; nor shall the fixture or associated fittings leak or suffer damage of any kind. Deflection shall be measured at the front most part of the fixture (i.e. the point on the fixture furthest away from the wall containing the fixture supports), with the load imposed at the same location as the measured deflection. Deflection shall not be exceeded in any direction with the force imposed in any direction.

2. Water Closets: 1/16-inch with a 300 pound force.
3. Other Fixtures: 1/16-inch with a 150 pound force.

D. Spare Parts: Provide two spare stop valves.

1.07 QUALITY ASSURANCE

- A. General: Provide quality assurance checks specified in Section 20 05 00 prior to submitting product data. By submitting products for Engineer's review, the Contractor is confirming that such checks have been performed and that the products are suitable for the intended installation and use.
- B. Fixtures:
 1. Types: Verify specified fixture types with the Architectural and Plumbing drawings to confirm the requirements are consistent (e.g. fixtures are wall mounted versus floor mounted type, locations of ADA fixtures match, etc.). Where conflicts occur clearly identify the issue on the fixture submittal along with a proposed resolution; or resolve prior to making the submittal by the project RFI process.
 2. Space Verification: Prior to ordering any fixtures or making submittals, Contractor shall check the drawings and verify that all fixtures will fit the space available (i.e. fixtures fit any cabinets fixtures are to be installed in; fixtures have adequate access clearances for proper use; etc.).
- C. Lead-Free Requirement: All items in contact with potable water shall be lead free. Fixtures used to dispense potable water for drinking shall meet the requirements of NSF/ANSI 61.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Water Closets: Kohler, American Standard, Eljer, Mansfield.
- C. Vitreous china (other than water closets) and enameled cast iron fixtures: American Standard, Kohler, Eljer, Mansfield.
- D. Water Closet Seats: Church, Beneke, Olsonite, Kohler, Bemis.
- E. Carriers: Josam, J.R. Smith, Wade, Zurn.
- F. Floor Drains and Floor Receptors: J.R. Smith, Zurn, Josam, Mifab.
- G. Plumbing Brass: McGuire, American Standard, Brasscraft, Dearborn Brass, Chicago Faucet, Crane, Eljer, Frost, Kohler, Speakman, Symmons, T & S Brass, Elkay.
- H. Faucets: Sloan, Chicago Faucet, T&S Brass, Kohler, American Standard, Grohe.
- I. Stops: McGuire, Brasscraft, ProFlo.
- J. Flush Valves: Sloan, Zurn.
- K. Shower Faucets: Chicago Faucet, Symmons, Powers.
- L. Hot Water Temperature Limiting Valve: Symmons, Watts, Chicago Faucet, Acorn Controls, Leonard, Cash Acme.

2.02 PLUMBING FIXTURES

A. General:

1. Plumbing Fixtures are listed below by reference numbers, corresponding to the reference number adjoining these items on the drawings.
2. All vitreous china and enameled cast iron fixtures shall be finished white unless specifically noted otherwise.
3. All stainless steel sinks shall be sound deadened, and shall have faucet ledge (except where noted specifically without ledge).
4. In interests of Owner's Standardization, fixtures of similar type shall be product of one manufacturer; trim of similar type shall be product of one manufacturer.

B. Water Closets:

P-1A Water Closet - Wall Hung - ADA:

Water Closet: Kohler "Kingston-Lite", No. K-4325, vitreous china, elongated bowl, wall mounted, siphon jet action bowl with 1-1/2" top spud, and 1.28 gallon flush.

Flush Valve: Sloan "Royal" 111-ESS-1.28-YO-TMO-HW chrome-plated low consumption flush valve with vacuum breaker, quiet-action, screw driver stop, sensor with true mechanical over-ride function. Provide with transformer located as shown on drawings, with low voltage wiring from transformer to flush valve.

Seat: Kohler "Lustra", No. K-4670-SC, white plastic elongated seat, open-front and stainless steel self-sustaining check hinge.

ADA: Configure and install for ADA access. Verify with Architectural drawings for mounting heights and off-center stall dimensions. Provide with flush valve so that handle is on wide side of stall.

P-1B Water Closet - Wall Hung:

Same as P-1A fixture, except that fixture shall be mounted for normal use.

C. Urinals:

P-2A Urinal - Wall Hung - ADA:

Urinal: Kohler "Bardon" No. K-4991-ET vitreous china, wall hung, with 3/4" top inlet spud wall hangers, and 0.125 gallon flush, and strainer.

Flush Valve: Sloan "Royal" 186-ESS-TMO chrome plated flush valve, with vacuum breaker, screw driver stop, and sensor. Provide with transformer located as shown on drawings, with low voltage wiring from transformer to flush valve.

Flush Valve: Sloan "Optima" 186 ES-S.

D. Lavatories:

P-3A Lavatory, Trough Type - Wall Hung - ADA:

Lavatory: Sloan DWSD-83000 Series 3-station lavatory, ADA compliant. Finish shall be Quartz, in color Antarctica. Shall be wall mount, for use with concealed arm carrier (or added backing plate). Each of the three stations shall have a faucet and soap dispenser.

Faucet: Sloan Optima series model EAF-200 deck mounted chrome finish faucet, 0.35 gpm, sensor activated for hardwired power. Provide with concealed below deck thermostatic mixing valve. Provide with remote transformer.

Soap Dispenser: Sloan Optima series model ESD-2000-CP deck mounted chrome finish soap dispenser, sensor activated for hardwired power. Provide with below deck bottle. Provide with remote transformer.

Plumbing Brass: Strainer Grid, chrome plated tailpiece, cast brass "P" trap with cleanout; stops and risers per "Specialties" in this specification section.

E. Shower:

P-9A Shower - Handicap:

Enclosure: By General Contractor.

Shower Unit: Symmons No. 96-500-B30-L-V-X Temptrol system; with pressure balancing mixing valve with piston, lever handle with adjustable screw stop and integral service stops, Clear Flo shower head, hand spray head with 5' flexible metal hose and in-line vacuum breaker, 30" slide bar for hand shower mounting, Levertrol 4-458 lever diverter valve.

F. Floor Drains:

P-11A Floor Drain:

J.R. Smith No. 2010-A cast iron body floor drain, with nickel bronze adjustable strainer head, round nickel bronze grate, vandal proof screws, reversible flashing collar, and trap primer connection. Size drain outlet to match pipe size shown on drawings.

2.03 OFF-THE-FLOOR FIXTURE SUPPORTS (CARRIERS)

- A. General: Type to suit fixture and building construction, with added anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement. Concealed in wall. Provide with all hardware and accessories for proper fixture support to suit the application. See Section 20 05 29 for hangers and supports.
- B. Water Closets: Cast iron or steel construction, adjustable to support fixture, with positive sealing gasket fabricated of closed cell neoprene. Shall be capable of supporting 700 lb load test per ANSI A112.19.2; Provide with rear anchoring lug on single units to comply. J.R. Smith 100, 200 and 300 series with added anchors and accessories to comply with maximum specified fixture movement.
- C. Urinals: Steel construction, with high strength steel uprights welded to 4-inch square steel base plates for floor anchoring, top and bottom fixture support and bearing plates, adjustable. J.R. Smith Figure 635 and 637 with added anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement.

- D. Lavatories: Steel construction, with 1-inch x 3-inch rectangular steel uprights welded to 4-inch square steel base plates for floor anchoring, and arms for lavatory support. J.R. Smith Figure 700 and 710 with added anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement.
- E. Other Fixtures: Manufacturers' standard carrier to suite fixture and application, steel construction with anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement.
- F. Non-Standard Fixtures: For fixtures that standard carriers are not manufactured for provide 3/16" thick steel back plate for block walls and wood stud walls; or a 2" x 2" x 1/4" angle welded to at least four studs for metal stud walls, with through bolts and fasteners to support fixture and comply with maximum specified fixture movement.

2.04 SPECIALTIES

- A. General: Unless indicated otherwise, the following fittings and materials (i.e. specialties) shall be used.
- B. Fixture Traps: 17 gage seamless chrome plated cast brass tubing, with 2 inch minimum seal, cast brass slip nuts, size as required by Uniform Plumbing Code (unless a larger size is indicated), and configured to suit the application. Provide with cleanout where indicated or required by code.
- C. Exposed Piping and Fittings: In finished areas and in accessible cabinets, provide piping with chrome plating or sleeved with chromed sleeves or of stainless steel construction/finish; all chrome to have a bright polished finish. No exposed copper allowed (includes accessible cabinet areas).
- D. Stops: Quarter turn ball valve type, chrome plated, UPC compliant, with low lead brass body, rated for minimum 125 psi operating pressure and temperature of water used with plus 20 deg F. Size and configuration to suit application. Provide with loose key where installed in areas with public access.
- E. Risers: Flexible braided steel type; rated for 125 psig.
- F. Escutcheons: See Section 20 05 19.
- G. Hot Water Temperature Limiting Valve: Thermostatic water temperature mixing valve with integral checks, complying with ASSE 1070 and UPC Chapter 4. Brass body with brass and stainless steel internal components. Leonard "ECO-Mix" 270 or Symmons "Maxline" Model 5-210.
- H. Sealant: See Section 20 05 30. Sealant at fixtures shall be the silicone type, color to match fixture.

PART 3 - EXECUTION

3.01 INSTALLATION OF FIXTURES

- A. General: All fixtures shall be completely connected to piping as needed to make a complete and operable installation.
- B. Fixture Locations: Mounting heights and locations of fixtures shall be as shown on the Architectural drawings and in accordance with Contract Document requirements. Locations shall be verified and coordinated with the various trades affected by the installation of these fixtures. When none indicated or shown, obtain mounting location and heights from the Architect/Engineer prior to installation. Floor drains shall be installed in proper locations and coordinated with floor slopes so that drains are set at low points to allow for floor drainage. Floor receptors (or floor sinks) shall be set flush with floors to allow drains to serve as both indirect drain receptors and as floor drains (unless noted otherwise or required to be elevated by code).
- C. Rough-In: Determine rough-in location of fixture utilities to suit fixture location, fixture dimensions, elements of construction (i.e. beams, studs, electrical, ducts, etc.), access requirements, casework dimensions, items which may drain/connect to fixture, use of fixture, and related considerations. The fixture rough-in locations indicated on the plans is schematic, and is not to be used for final rough-in purposes. Coordinate fixture locations with other systems so that either conflicting items are relocated or fixture locations are adjusted to suit.
- D. Offsets: Provide offsets in piping to fixtures to accommodate building systems. Such offsets shall include off-setting waste piping into cabinet bases (in kick space where possible) to accommodate beams located directly below walls behind fixtures.
- E. Carriers: All off-the-floor (i.e. wall) mounted fixtures shall be installed with supporting carriers and additional anchors, bracing and supports to transmit fixture loads to the floor and building structure without exceeding the maximum specified fixture movement. Prior to concealing carrier and associated supports review adequacy of support system with Architect/Engineer.
- F. Fixture Sealant: Where fixtures abut to walls, floors, and cabinets seal all joints with a uniform fillet bead of sealant. Provide at other locations as recommended by fixture manufacturer.
- G. Protection: Protect fixtures against use and damage until project substantial completion; provide guards and/or boxing to protect.

3.02 INSTALLATION OF SPECIALTIES

- A. Escutcheons: Provide escutcheons at each point where an exposed pipe or other fitting passes through walls, floors, backs of cabinets, or ceilings.
- B. Stops: Provide stops in water connections to all fixtures/equipment, except where a stop valve is integral to the fixture (e.g. flush valves) and in water connections to all items not served by another valve.
- C. Hot Water Temperature Limiting Valve: Install on all lavatories, hand wash sinks, bathtubs, showers, whirlpools, bidets and at fixtures required by Code (reference UPC Chapter 4); set for 115 deg F maximum delivery temperature. Test and adjust for proper operation and submit written report documenting work performed.

3.03 ADJUSTMENT AND CLEANING

- A. Cleaning: After completion of installation remove all labels and thoroughly clean all fixtures, trim and fittings.
- B. Adjustment: Adjust all flush valves, fixture stops, faucets, valves, and associated plumbing items as necessary for the proper operation of all fixtures and equipment.

END OF SECTION 22 40 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Environmental Ductwork Systems.
- B. Flexible Duct.
- C. Acoustical Duct Lining.
- D. Preparation of Duct for Service.
- E. Duct Pressure Testing.

1.03 DEFINITIONS

- A. Duct Sizes: All duct dimensions shown are inside clear dimensions. Where inside duct lining is specified or indicated, duct dimensions are to the inside face of lining.

1.04 QUALITY ASSURANCE

- A. All work and materials shall comply with SMACNA-DCS, NAIMA-DLS, ASHRAE-F, IBC, IMC, NFPA-90A, NFPA-90B, and code. The most restrictive criteria governs.
- B. Leakage Criteria: Duct system shall be constructed and sealed so that leakage does not exceed the following:
 - 1. Constant Volume Supply Systems - Supply Duct: From fan to connection to air outlet 5%.
 - 2. All Systems - Return Duct: 5%.
 - 3. All Systems - Exhaust Duct: 5%.
- C. Fabrication Proximity: The Contractor performing the work of this section shall have fabricating facilities located within 100 miles of the project site.
- D. Drawing Review: Prior to beginning any work review all drawings, duct routing, duct connections, equipment configuration, equipment connection locations, and other work details to discover conflicts in anticipated duct arrangement and improper or incomplete connections. Review shall include the following: supply ducts not connected into return (or exhaust) ducts, ducts not crossed and improperly connected in shafts, air outlets/inlets connected to ducts, unit configuration compatible with planned duct connections, louver locations match architectural plans. Submit resolutions of such possible conflicts as submittals with shop drawings of proposed solutions; written description in lieu of shop drawings is acceptable for minor issues.

1.05 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product data for duct lining, flexible duct, and factory fabricated items.
- C. Shop Drawings: Submit shop drawings for all HVAC ductwork which is to be installed differently than as shown on the drawings.

- D. Conflict Resolution: Submit additional shop drawings showing proposed resolution of conflicts after review of documents and again after review of actual field conditions.

1.06 DUCT PRESSURE CLASS

- A. Constant Volume Systems: Ductwork shall be constructed to 2-inch pressure class (plus or minus as appropriate), unless noted otherwise.

1.07 REFERENCES

- A. ADC-FLEX: Air Diffusion Council Flexible Duct Performance and Installation Standards.
- B. ASHRAE-F: ASHRAE Handbook of Fundamentals.
- C. ASTM A 653: Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- D. ASTM A 924: General Requirements for Steel Sheet Metallic-Coated by the Hot-Dip Process.
- E. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. IMC: International Mechanical Code.
- G. NAIMA-DLS: North American Insulation Manufacturers Association Fibrous Duct Liner Standards, 1st Edition.
- H. NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems.
- I. NFPA 90B: Standard for the Installation of Warm Air Heating and Air Conditioning Systems.
- J. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.
- K. UL 181: Underwriter Laboratories Factory-Made Air Ducts and Air Connectors.
- L. UL 181A: Underwriter Laboratories Closure Systems for Use with Rigid Air Ducts.
- M. UL 181B: Underwriter Laboratories Closure Systems for Use with Flexible Air Ducts and Air Connectors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Sheet Metal: All domestic manufacturers.
- C. Spin-in Fittings and ATTO: Sheet Metal Connectors Inc., United McGill, Royal Metal Products, Airflow Products Inc.
- D. Gasketing: Preson, Insulfab, Duraco.
- E. Duct Sealant and Tape: Carlisle (Hardcast), Ductmate, Benjamin Foster, Grace Construction Products, United McGill, Polymer Adhesives Sealant Systems, RCD Corporation, Nashua, 3M.
- F. Flexible Duct: Flexible Technology Inc., JP Lamborn Co.; Hart & Cooley, Thermaflex.
- G. Acoustical Duct Lining: Johns-Manville.

2.02 GENERAL MATERIALS

- A. Ducts: Construct of galvanized sheet steel, suitable for lock forming without flaking or cracking, conforming to ASTM A653 and A924, having a zinc coating of 0.90 ounces total per square foot for both sides of a sheet, corresponding to coating G90.
- B. Fasteners: Steel construction, electroplated zinc coated, having strength properties adequate for the application, compatible with materials being joined, and in accordance with SMACNA-DCS. Where exposed to corrosive conditions shall be of Type 304 or 316 stainless steel. Type to meet duct pressure class and duct leakage requirements. Where used for the support and anchorage of ducts shall comply with Section 20 05 29, with independent test reports regarding strength.
- C. Spin-in Fittings: Factory fabricated of galvanized steel with die-formed mounting groove and damper with raised damper quadrant where ducts are to be insulated. Collar length for flexible duct attachment shall be at least 2" long.
- D. Air-Tight Take-Off Fittings (ATTO): Factory fabricated branch duct connector, of galvanized steel. Flange shall be 1-1/2" wide with 1/8" self-adhesive gasket and pre-drilled fastener holes. Collar length for flexible duct attachment shall be at least 2" long. Where used on round duct mains, shall be saddle type appropriately sized for main duct diameter.
- E. Draw Bands:
 - 1. Metal: Worm gear type clamp, constructed of galvanized steel, stainless steel, or aluminum; minimum 1/2-inch wide band; suitable for 200 pound loading.
 - 2. Non-Metal: Nylon "zip-tie" with self-locking ability, designed for flexible duct usage, minimum 1/4 inch wide, rated for 175 pound load, suitable for temperatures from 0 to 185 deg F; listed per UL181B and labeled "UL181B-C".
- F. Gasketing: Vinyl nitrile, vinyl neoprene, or neoprene nitrile PVC blend; designed for HVAC use with size to suit the application having minimum 1.5-inch width at equipment roof curb applications. Fire hazard rating not to exceed 25 for flame spread and 50 for smoke development per ASTM E 84.
- G. Duct Sealant/Mastic: Water based duct sealant, listed per UL 181B-M and UL 181A-M, suitable for indoor and outdoor use. Fire resistant with a flame spread rating of 5 or less, and a smoke developed rating of 0. Sealant shall be resistant to ultraviolet radiation and ozone. Fiberglass mesh shall be minimum 0.006-inches thick, with minimum 9 x 9 weaves per inch, and 2-inch width; for use with mastic in sealing ductwork. Sealant system shall be suitable for duct system pressure class and materials used with. Carlisle Hardcast "Versa-Grip 181".
- H. Foil Tape: Foil back adhesive tape, listed per UL181A-P and UL181B-FX, with listing labeled on tape outer foil face. Minimum 3-inch width for metal-to-metal applications; minimum 2-inch width for flexible duct applications. 3M No. 3340 or Nashua No. 324A.

2.03 DUCT FABRICATION

- A. Duct Gauge and Reinforcement: Shall be as shown in SMACNA-DCS according to the pressure classification of the system and the duct dimensions; with heavier gauge duct used as required to minimize duct reinforcement to suit space available and other project constraints. In no case shall ducts be constructed of less than 26 gauge material.

- B. Joints and Seams: Construct in accordance with SMACNA -DCS, code requirements, and these specifications (more stringent governs). Ducts shall be constructed and sealed so that the leakage criteria is not exceeded. Round ducts shall be the spiral seam type; except that branch ducts to individual air inlets/outlets less than 16" diameter may be of other types as allowed by SMACNA-DCS. Coordinate joint spacing with duct reinforcement requirements so that transverse joints having the required stiffness may be incorporated in the reinforcement spacing schedule. Round duct transverse joints shall be made with beaded sleeve joints or flanged connections in accordance with SMACNA-DCS; except that branch ducts to individual air inlets/outlets less than 16" diameter may use other joining methods as are allowed by SMACNA-DCS.
- C. Elbows and Tees: Shall be long-radius type with a center-line radius not less than 1-1/2 times the width or diameter of the duct. Where space does not permit the use of long-radius elbows, short-radius or square elbows with turning vanes may be used. Elbows in round duct systems with duct pressure class above 2-inches shall be stamped type, welded segmented type, or standing seam segmented type.
- D. Transitions: Increase duct sizes gradually. Transitions for diverging air flow shall be made with each side pitched out not more than 22.5 degrees. Transitions for converging air flow shall be made with each side pitched in not more than 30 degrees. Except that eccentric transitions for round to flat oval may have up to a 45 degree pitch.
- E. Branch Connections: Shall comply with SMACNA-DCS, and as required herein.
 - 1. Rectangular-to-Rectangular: Rectangular take-off with 45 degree angle on "inside" of take-off, minimum 4" length. Reference SMANCA-DCS Figure 4-6. Close corner openings.
 - 2. Rectangular-to-Round:
 - a. Serving Individual Air Inlet/Outlet: Spin-in type connector or air-tight take-off (unless a different fitting type is specifically noted).
 - b. Serving Branch Duct: Rectangular to round transition, with maximum degree pitch as specified for transitions. Rectangular end size shall have free area no less than round end. Rectangular connection to rectangular main shall be made as specified for "Rectangular-to-Rectangular" connections.
 - c. Serving Individual VAV Terminal Unit: Conical type connector, with connector 2" larger on one end and maximum 15 degree pitch on sides.
 - 3. Round-to-Round:
 - a. Serving Individual VAV Terminal Unit: Conical type connector (or conical tee fitting), with connection at the main duct 2" larger than the end serving the VAV terminal unit, and a maximum 15 degree pitch on sides; or "Lo-Loss" tee fitting, equivalent to that manufactured by United McGill.
 - b. Other Connections: Air-tight take-off or constructed in accordance with SMACNA-DCS and recognized professional practices.
 - 4. Other Connections: In accordance with SMACNA-DCS and recognized professional practices.

F. Ductmate Systems:

1. Rectangular Duct: Transverse duct joints may be made with Ductmate System, or approved equal. System shall consist of companion flanges of 20 gauge galvanized steel with an integral polymer mastic seal; corner pieces of 12 gauge G90 galvanized steel; 20 gauge G90 galvanized cleats; closed cell, high density gasket type; and galvanized carriage bolts with hex nuts. The flanges shall be securely fastened to the duct walls using self-drilling screws, rivets or spot welding. Fastener spacing shall be as recommended by the manufacturer for the size of duct and the pressure class. The raw duct ends shall be properly seated in the integral mastic seal. A continuous strip of gasket tape, size 1/4" x 3/4", shall be installed between the mating flanges of the companion angles at each transverse joint; and the joint shall be made up using 3/8-inch diameter x 1-inch long plated bolts and nuts. Galvanized drive-on or snap-on cleats shall be used at spacing recommended by the manufacturer.
2. Round Duct: Transverse duct joints may be made with Ductmate "Spiralmate" system, or approved equal. System shall consist of galvanized steel round connector flanges (fitting inside each duct section to be joined) and an exterior galvanized steel closure ring with tightening bolt to form an airtight duct connection and join flanges together. Duct connector flanges shall have non-hardening integral mastic to seal between flanges and duct, and a neoprene gasket to seal flange faces.

G. Lined Ductwork:

1. Rectangular Ducts: Contractor Fabricated ductwork with interior duct lining. Duct fabrication and liner installation shall comply with NAIMA-DLS. Lining material shall comply with paragraph titled "Duct Lining" in this specification section.
2. Round and Oval Ducts: Shall consist of acoustic insulation in between a perforated interior duct liner and solid exterior duct. Acoustic insulation shall be 1-inch thick, except where noted to be greater. Duct sections shall connect by mechanical means to maintain positive concentricity of liner with duct. All fittings and transitions shall have perforated inner liner (except where noted otherwise). Lining material shall comply with paragraph titled "Duct Lining" in this specification section. United McGill "Acousti-k27" (or approved).

2.04 FLEXIBLE DUCT

- A. Type: Factory insulated fully lined flexible duct.
- B. Construction: Double-ply neoprene coated polyester fabric hose, reinforced with a steel wire helix. Black color. Fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E84.
- C. Thermal Characteristics: Certified thermal resistance "R" of 4.2 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX. Except where duct is installed in an unconditioned area (and where required by code) provide certified thermal resistance "R" of 8 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX.
- D. Working Pressure: As required to suit maximum pressure to be encountered on system, but no less than 4-inch wc positive, 0.5-inch wc negative.
- E. Length: Shall not exceed 8 feet where used on duct systems with a pressure class of 2-inches and less; maximum 5 feet length on higher pressure class systems.
- F. Code Compliance: Comply with code and applicable standards; including NFPA 90A, NFPA 90. Shall be UL listed and labeled as a Class 1 connector per UL 181.

2.05 DUCT LINING

- A. Material: Flexible, inorganic glass fiber material, bonded with thermosetting resin, maximum thermal conductivity of 0.24 Btu-inch/hr-sq. ft.-degree F at 75 degrees F, coated to prevent erosion, conforming to NAIMA-DLS and exceeding that standard as specified herein. Suitable for air temperatures to 250 degrees F, and duct velocities to 6000 feet per minute. Surface shall be coated with an acrylic coating having anti-microbial agents and factory applied edge coating. Johns-Manville "Permacote Linacoustic" (or approved).
- B. Thickness: Lining shall be 1-inch thick except where noted otherwise.
- C. Adhesives and Fasteners: Shall conform to NAIMA-DLS, and as suitable for the duct liner material and ductwork.
- D. Fungi and Bacteria Resistance: Conform to ASTM C 1338 and ASTM G21 for fungi resistance and ASTM G 22 for bacteria resistance.

PART 3 - EXECUTION

3.01 DUCTWORK INSTALLATION

- A. General: Install all ductwork with all accessories and connections to provide complete and operable duct systems, in accordance with plans and specifications. See Section 20 05 29 for hangers and supports. Provide quality assurance review of all drawings prior to beginning work (see paragraph titled Quality Assurance, this specification Section and see Section 20 05 00). Provide duct and plenum sizes and locations as shown on the drawings; except as adjusted for field conditions and work of other trades, and with prior approval of the Engineer. See Section 20 05 00 for offsets and transitions to be included in project.
- B. Coordination: The Contractor shall fully coordinate the work of all trades to avoid interferences and conflicts. Due to the extremely tight spaces in portions of the building, the Contractor shall coordinate duct reinforcement spacing and supports with other trades as necessary to avoid interferences. In addition, the Contractor shall select duct gauge and reinforcement types to avoid interferences. Changes required due to lack of coordination between trades, improper spacing or selection of hangers, or improper duct gauge and reinforcement selection, shall be done at no additional cost to the owner.
- C. Field Measurements: Prior to fabricating any duct materials, the Contractor shall field measure all areas where ducts will be installed to verify room available and all offsets and fittings required. Field verify connection sizes and locations to equipment, louvers, and similar items.
- D. Workmanship: All work shall comply with code, SMACNA-DCS, and other applicable standards. Ducts shall be installed level (unless noted otherwise) and in neat lines with the building construction using best professional practices.
- E. Exposed Ducts:
 - 1. All ducts are to be installed concealed unless indicated otherwise. Ducts that are exposed shall be carefully fabricated, stored, and installed for best appearance. All dents, dings, scratches and other damage shall be repaired for a high quality finished look; all dirt, debris, labels, stickers, lettering, and marks removed; and the duct completely cleaned. Any sealant shall be cleaned to form a straight and even seam adjacent to joints, have no overlap onto duct areas not needing sealant, and have all excess sealant removed (mask off adjacent areas as necessary).

2. Outdoor exposed ducts shall have "hat" type channels installed over all joints (top and sides) to prevent entry of water.
- F. Flexible Duct: May only be used where specifically shown on the plans. Attach flexible duct inner core to sheet metal duct (or connector) with draw band. For insulated type, pull insulation and outer jacket completely over the inner core (at the connection to the sheet metal duct) with outer jacket covering the inner core and tucked back at its end to provide a continuous vapor barrier cover; install draw band to secure the outer jacket and insulation. Use metal type draw bands on duct systems where duct pressure class exceeds 3-inches or where temperature or other conditions do not allow the non-metal type and where indicated; use type of metal suitable for the conditions without corrosion or other deterioration. Install flexible duct with a centerline turning radius not less than one duct diameter. Where this turning radius cannot be maintained with the flexible duct use sheet metal elbows or (at air inlets/outlets) provide a plenum having a side connection.
- G. Spin-in Fittings/ATTO's: May be used for branch ducts to individual outlets only. Apply a bead of duct sealant to all spin-in fittings where fitting seals against sheet metal duct.
- H. Sealing:
1. General: Use materials listed and approved for the specific application. Foil tape may only be used at duct connections to air inlets/outlets (unless specifically noted otherwise). Clean surfaces to be sealed of moisture and all contaminants. Seal joints in accordance with SMACNA-DCS, sealant manufacturer's instructions, and UL 181.
 2. Ductwork: Seal to meet duct leakage criteria as follows:
 - a. Ducts with Pressure Class 2": Seal Class B.
 3. Flexible Duct: Coat connection of flexible duct to metal duct with duct sealant prior to installing the flexible duct.
 4. Air Inlets/Outlets: Seal duct connections (including "cans" or plenums) at air inlets and air outlets with duct sealant or foil tape; except at louvers and exposed ducts only sealant shall be used.
- I. Ductmate: All "Ductmate" and similar systems shall be installed in strict accordance with manufacturer's instructions.
- J. Protective Caps: Provide temporary sheetmetal caps or heavy visqueen covers over all open portions of ductwork to prevent debris, dirt, and dust from entering the ductwork. Such covers shall be installed at the end of each work shift, and shall remain in place until all work activities or events that may cause duct contamination will no longer occur.

3.02 ACOUSTICAL DUCT LINING INSTALLATION

- A. General: Install acoustical duct lining in ducts to extent shown on drawings, covering all interior surfaces. Round ducts shall use factory fabricated double-wall ducts as specified.
- B. Installation: Installation shall comply with NAIMA-DLS and these specifications. The liner shall be cut to assure tightly butted joints.
- C. Liner Attachments: The duct liner shall be applied with a 100% coverage of adhesive. Mechanical Fasteners shall be installed flush with the liner surface, and shall be spaced in accordance NAIMA-DLS.
- D. Horizontal Duct Runs: Tops of ducts over 12" wide and sides of duct over 16" high shall have liner additionally secured with mechanical fasteners.

- E. Vertical Duct Runs: Any side of duct over 12" in size shall have liner additionally secured with mechanical fasteners.
- F. Exposed Edges: All joints, exposed edges and any damaged areas of the liner, shall be heavily coated with fire resistant adhesive/mastic.
- G. Metal Nosing: Install metal nosings on the leading edges of the liner in ducts where the velocity exceeds 4000 feet per minute.

3.03 PREPARATION FOR SERVICE

- A. Cleaning: All ducts shall be wiped or blown clean of all dust and debris prior to the installation of grilles or diffusers. Notify the Engineer to allow for an inspection prior to installing grilles or diffusers.
- B. Contaminated Ducts: Where ducts have been contaminated by dirt or debris during the construction process, the affected duct systems shall be cleaned by an independent firm specializing in the vacuum cleaning of ductwork. All costs associated with such cleaning shall be the responsibility of the Contractor.

3.04 DUCT PRESSURE TESTING

- A. Tested Systems: All supply air duct systems shall be tested.
- B. Duct Pressure Class > 2-inches:
 - 1. Cap all outlets temporarily to isolate the portion of the system being tested.
 - 2. Use portable blower with volume adjustment and a calibrated orifice for determining cfm of air being added to ductwork. Maintain duct system rated pressure in duct; examine each section at this pressure, and seal all observable leaks so that leakage during final testing will be at or below maximum permissible leakage.
 - 3. Maximum Permissible Leakage: See "Quality Assurance" paragraph, Part 1 of this specification section.
 - 4. Final test of each section shall be witnessed by the Architect/Engineer or Owner's representative. Give Architect/Engineer at least 7 days prior notice before such test.
 - 5. Test Data: Record data of test results of final test only, including sketch or diagram of tested section, computation of total system cfm, allowable leakage and actual leakage found during test. Submit two copies to Architect/Engineer.
- C. Duct Pressure Class \leq 2-inches: Air balancers readings will be used to determine percent leakage of ductwork. Where leakage exceeds allowable by 25% or less, sealing shall be provided at all potential leak spots. Where leakage exceeds allowable by more than 25%, the system shall be re-sealed and the Sheetmetal Contractor shall pay the Balancer to re-measure and determine the new leakage rate.

END OF SECTION 23 31 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. Manual Dampers.
- B. Fire Dampers.
- C. Turning Vanes.
- D. Flexible Connectors.
- E. Duct Access Doors.

1.03 QUALITY ASSURANCE

- A. General: Comply with Section 20 05 00.
- B. Workmanship: Construction and installation of all duct accessories shall comply with applicable SMACNA-DCS, and exceed those standards as noted.

1.04 SUBMITTALS

- A. General: Submittals shall comply with Section 20 05 00.
- B. Product Data: Submit product information on all items to be used.

1.05 REFERENCES

- A. AMCA 500D: Laboratory Methods for Testing Dampers for Rating.
- B. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Manual Damper Hardware: Duro-Dyne, Young Regulator Co., Ventfabrics, Krueger, Rossi.
- C. Turning Vanes: Duro-Dyne, Aero-Dyne, Oil Capital Sheet Metal, Airsan.
- D. Flexible Connections: Ventfabrics, Duro-Dyne Elgen.
- E. Duct Access Doors: National Controlled Air, Ventfabrics, United-McGill, Kees, Ruskin, Vent Products, Duro-Dyne.
- F. Building Access Doors: J.R. Smith, Zurn, Acudor, Elmdoor, Kees, J.C. Industries, Milcor.

2.02 MANUAL DAMPERS

- A. Type: Manually adjustable volume dampers.
- B. Blades: Damper blades shall be fabricated of galvanized steel or stainless steel (unless a specific material is indicated), two gages heavier than duct in which installed, and in accordance with SMACNA-DCS. Maximum blade width 12 inches; fabricate multi-blade dampers with opposed blade pattern for ducts larger than 12" x 48".
- C. Regulators: Damper regulator sets shall have quadrant dial regulator with locking nut, square end bearing one side, and spring round end bearing other side (small sizes) or open end square bearing (larger sizes), axis of blade the long dimension. Multiple blade dampers shall have individual quadrants for each blade or one quadrant with interconnected blades. Regulator sets shall be Duro-Dyne model numbers (or approved equal) as follows:

Max. Blade

| <u>Dimension</u> | <u>Duro-Dyne Regulator Set</u> | <u>Shaft Size</u> |
|------------------|--------------------------------|-------------------|
| 10" and less | KS-145, 145L | 1/4" |
| 11" to 14" | KSR-195, 195L | 3/8" |
| 15" to 23" | SRS-388, SB-138, KP105 | 3/8" |
| 24" and larger | SRS-128, SB-112, KP105 | 1/2" |

- D. Concealed Regulator: For remote damper adjustment with finished ceiling appearance. Shall consist of self-locking regulator of cast alloy construction (with serrated core, spring washer, housing, indicator, lock nut) cast into a cylindrical housing for flush ceiling installation. Housing cover shall be of steel construction, shall telescope into the regulator housing to be flush with the finished ceiling, and be secured to the housing with two screws. Provide with extension rods, linkages, miter gears, and all accessories as needed for proper damper operation. Plain Finish. Ventfabrics No. 666, 667 or Young Regulator Co. No. 301 (or approved equal).
- E. Extractor Fittings: Galvanized steel construction, 24 gauge steel blades on 2 inch centers, with worm gear operator for adjustment through face of grille. Krueger EX-88 (or approved equal).

2.03 MANUAL DAMPERS – CABLE OPERATED

- A. General: Cable operated system of dampers and rack and pinion type controller, made for use to allow remote damper adjustment.
- B. Round Dampers: Constructed of heavy duty galvanized steel duct with rolled-in stiffening beads for rigidity. Damper minimum 20 gauge galvanized steel blade secured with 1/2" diameter steel shaft and high strength Teflon bushings requiring no lubrication. Damper shall include all necessary hardware to ensure compatibility with remote cable control system. Young Regulator Model 5020-CC (or approved).
- C. Rectangular Dampers: Opposed blade type constructed of 0.050 minimum heavy duty extruded aluminum frames and blades. Damper blades to include individual blade bushings; damper blades shall rotate between a matched pair of formed and punched 306 stainless steel connecting slide rails that facilitate smooth blade movement and ensure alignment. All necessary hardware to ensure compatibility with remote cable control system shall be included. Young Regulator Model 830A-CC series (or approved).

- D. Cable Control: Cable to consist of 0.054" stainless steel cable encapsulated in 1/16" flexible galvanized spiral wire sheath. Control hardware shall be designed for use with damper to be controlled with wall mounted. Control hardware shall include 14 gauge steel rack and pinion gear drive, controls shaft shall be flatted 1/4" diameter with 265-degree rotation provided linear travel capability. Where ceiling access is indicated provide with concealed regulator assembly; wall mounted shall have exposed knob control, with position indicator. Young Regulator Model 270-275 or 270-301 or 270-700 to suit application (or approved).

2.04 TURNING VANES

- A. Type: Galvanized steel turning vanes to guide airflow through duct elbows to minimize pressure drop.
- B. Construction: Turning vanes shall comply with SMACNA-DCS. Vanes shall be fabricated of minimum 26 gauge galvanized steel; rails shall be fabricated of minimum 24 gauge galvanized steel. For duct widths less than 12 inches, vanes may be single wall construction; for widths 12" and greater, vanes shall be double wall "airfoil" type.
- C. Spacing: Turning vanes shall be equally spaced in accordance with SMACNA-DCS, parallel to each other, and securely attached to runners.
- D. Unequal Elbows: For elbows where the inlet and outlet dimensions are not the same, modify vane shape or angle to provide optimum turning.

2.05 FLEXIBLE CONNECTORS

- A. Type: Flexible fabric type connectors, to provide vibration isolation at equipment duct connections and to allow for movement in duct systems.
- B. Fabric:
 - 1. Width: Minimum 3" wide except at equipment 3 hp or larger with external vibration isolators fabric shall be minimum 6" wide.
 - 2. Indoor Applications: Flexible woven glass fiber fabric with neoprene coating, minimum 22 oz/sq. yard, 500 lbs x 450 lbs tensile strength. Suitable for temperatures from -40 to 200 deg F.
 - 3. Outdoor Applications and Where Exposed to Chemicals: Flexible woven glass fiber fabric with hypalon coating, ozone resistant, 24 oz/sq. yard, 225 lbs x 300 lbs tensile strength. Suitable for temperatures from -40 to 250 deg F.
 - 4. High Temperature Applications: Fiberglass/satin weave with Teflon coating; temperature rating of minimum 500 deg F and to suit application, 400 lbs x 300 lbs tensile strength.
- C. Metal Collars: Minimum 24 gauge galvanized steel 3" wide metal edge connectors, each side of fabric, connected to fabric by folded over metal seam. Fabricate of same material as ducts connected to.
- D. Fire/Smoke Rating: Flame spread rating not over 25, and smoke developed rating not higher than 50; complying with IMC requirements and NFPA standards.

2.06 DUCT ACCESS DOORS

- A. Construction: Access doors shall be of double wall construction, made with minimum 24 gage galvanized steel, tight fitting, with sealing gasket, and cam locks (or may be hinged type with latches).

- B. Size:
 - 1. General: Access doors shall be of sufficient size so that items concealed in duct can be serviced and inspected, and shall be adequately sized to allow complete removal of the item being served (where removal cannot be made without disturbing fixed ductwork).
 - 2. Minimum size: Doors shall be minimum 14" x 14". Where duct size will not accommodate this size door, the doors shall be made as large as practicable.
 - 3. Large Sizes: Doors larger than 14" x 14" shall have a minimum of 4 cam locks (or where hinged type is used, have a minimum of two (2) latches).
- C. Insulation: Doors in insulated ducts shall be insulated type, with minimum 1 inch thick fiberglass insulation.
- D. Round Ducts: Access doors on round ducts shall use either lined rectangular tap off with rectangular access door or curved insulated access door (for insulated duct); or curved type un-insulated access door (for un-insulated duct).

2.07 BUILDING ACCESS DOORS

- A. Type: Hinged lockable steel access doors, for wall or ceiling installation.
- B. Construction: Minimum 16 gauge frame and 14 gauge door, concealed hinge, cam and cylinder lock, anchoring provisions, and 1" wide frame to conceal rough building opening. Provide of 18-8 stainless steel construction with No. 4 finish where used in restrooms, locker rooms, kitchens, and similar "wet" areas. Provide of steel construction with prime coated finish in other areas.
- C. Size: Size shall be 12" x 12" (unless indicated otherwise) but shall be large enough to allow necessary access to item being served and sized to allow removal of the item (where access door is the only means of removal without disturbing fixed construction).
- D. Fire Rating: Door shall maintain fire rating of element installed in; reference drawings for required rating.
- E. Keys: Access doors shall all be keyed alike. Provide two (2) keys for each door.

PART 3 - EXECUTION

3.01 MANUAL DAMPERS

- A. General: Dampers shall be fabricated and installed in accordance with SMACNA-DCS requirements for volume dampers.
- B. Locations: Install dampers at locations shown on the drawings in branch ducts to all air inlets/outlets, and at all other locations as required by the Balancer to allow for the balancing of the system. Locate dampers at a point where the damper is most accessible; orient damper regulator for best access.
- C. Non Accessible Dampers: Provide flush-mounted concealed type damper quadrants for ducts concealed in walls or non-removable ceilings and where a remote damper operator has been indicated.
- D. Initial Setting: Set and lock all dampers in the full open position prior to balancing.
- E. Extractor Fittings: Provide where indicated on the plans and at wall type inlets/outlets where such outlets cannot be served by a manual damper in the branch duct.

- F. Identification: Provide orange surveyor's tape, approximately 18" long tied to each damper regulator (except not required on dampers in ducts exposed to view in finished areas).

3.02 TURNING VANES

- A. General: Install turning vanes in all duct elbows and "T" fittings, and at locations shown on the drawings.
- B. Attachment: Securely attach turning vane runners to ductwork.

3.03 FLEXIBLE CONNECTORS

- A. General: Provide flexible connectors at all duct connections to all equipment, where ducts of dissimilar metals are connected, and where shown on the drawings. Except that flexible connectors are not required on internally spring isolated fans where the fan is located in a separate mechanical room and a flexible connector has not been shown.
- B. Round: For round ducts, the flexible material may be secured by zinc-coated, iron clinch type draw bands directly to adjoining duct; or with normal duct joining methods and using metal collars furnished with flexible connectors.
- C. Slack: Install flexible connections with sufficient slack to permit 1 inch of horizontal or vertical movement of ducts or equipment at flexible connection point without stretching the flexible material. At building expansion joints install sufficient flexible material to allow for 2 inch movement in any direction; provide two flexible connectors separated by a 12 inch section of duct.
- D. Outdoors: Where installed exposed to outside weather, provide a galvanized "hat" channel protecting top and vertical stretches of flexible connector from sunlight and weather.

3.04 DUCT ACCESS DOORS

- A. General: Provide duct access doors at all automatic control dampers, fire dampers, fire/smoke dampers, smoke dampers, backdraft dampers, all duct coils, thermostats, filters, control devices, and any other components in the duct system that require service or inspection.
- B. Return and Exhaust Ducts: Provide access doors every 20 feet in return and exhaust air ductwork as required by NFPA 90.
- C. Size and Location: Access doors shall be of sufficient size and so located so that the concealed items may be serviced and inspected or completely removed and replaced.

3.05 BUILDING ACCESS DOORS

- A. General: Provide access doors in walls, floors, ceilings, etc. as indicated on the drawings and where needed to provide service access or maintenance to duct access doors, backdraft dampers, damper actuators, automatic dampers, coils, control devices, fans, HVAC equipment and similar items.
- B. Coordination: Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation.

END OF SECTION 23 33 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

- A. GRD Outlets.
- B. GRD Inlets.

1.03 DEFINITIONS

- A. GRD's: Grilles, Registers, and Diffusers.

1.04 REFERENCES

- A. AHRI 885: Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.
- B. AMCA 500: Laboratory Methods of Testing Louvers for Rating.
- C. ASHRAE 70: Method of Testing the Performance of Air Outlets and Air Inlets.
- D. ASHRAE-F: ASHRAE Handbook of Fundamentals.
- E. SMACNA-DCS: HVAC Duct Construction Standards, 3rd Edition.

1.05 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product information for all items to be used.
- C. Operation and Maintenance: Submit operation and maintenance data and submittal data for inclusion in project O&M Manuals.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Grilles, Registers and Diffusers: Titus, MetalAire, Krueger, Price, Tuttle & Bailey, Kees, Carnes.

2.02 GENERAL REQUIREMENTS

- A. Type: Air outlets and inlets shall be of the size, type, and with number of throws as shown on the drawings; and shall match the appearance and performance of the manufacturers' models specified and scheduled on the drawings.
- B. Performance: Air outlet and outlet performance shall be based on tests conducted in accordance with ASHRAE 70.

- C. Sound Level: Air outlets and inlets shall not exceed a sound level of NC 30 for the size indicated and airflow rate application. Sound levels shall be determined in accordance with AHRI 885 and ASHRAE-F.
- D. Finish: Grilles, Registers and Diffusers shall have factory applied finish, color as selected by Architect/Engineer, except where indicated to have a brushed aluminum finish (or other finish type). Finish shall be an anodic acrylic paint, baked on, with a pencil hardness HB to H. Pint shall pass a 90 hour ASTM B117 salt spray test, 250 hour ASTM D870 water immersion test, and an ASTM D2794 reverse impact test with at least a 50 inch-pound force applied.
- E. Frame Style: Provide air outlets and inlets with frame style to match ceiling or wall construction installed in. Where supply air outlets or inlets are installed in T-bar ceiling systems, they shall be factory installed in 2' x 2' or 2' x 4' metal panel to match ceiling layout. Where installed against gypsum board surface, brick or similar hard surface, or where exposed, provide with 1-1/4-inch wide outer border. Where space does not permit installing 2' x 2' metal panel, provide outlets or inlets with 1-1/4-inch wide outer border. Where air outlets are installed adjacent to surface mounted light fixtures, outlets shall have 4-inch deep drop frames. (See reflected ceiling plan and/or electrical lighting plan for ceiling and lighting types).
- F. Transfer Grilles: Ceiling transfer grilles shall be same as ceiling exhaust grilles (CEG) unless noted otherwise.
- G. Construction: Air outlets and inlets shall be of steel or aluminum construction except that:
 - 1. Where noted to be constructed of a specific material, shall be as noted.
 - 2. In assemblies with a required fire rating and required to have fire dampers shall be of steel construction.
 - 3. In wet areas or subject to condensation (i.e., locker rooms, restrooms, kitchens, exterior soffits, etc.), where not used in fire rated assemblies, shall be of aluminum construction.
 - 4. Air outlets and inlets in the same room, area, or within common view shall be constructed of the same material.

2.03 SUPPLY AIR OUTLETS

- A. Ceiling Diffuser (CD): Aluminum or steel construction, modular core, with multiple curved (or angled) discharge blades, and square neck. Cores shall consist of four separate sections which can be repositioned to allow for one, two, three or four way discharges. Cores shall be easily removed with no tools required. Krueger 1240 Series, Titus MCD, MCD-AA Series (or approved equal).

2.04 RETURN AIR INLETS

- A. Ceiling Return Grille (CRG): Aluminum construction, "cube-core" or "egg-crate" type, with 0.025-inch thick x 1/2-inch deep strips mechanically joined to form 1/2" x 1/2" x 1/2" cubes. Krueger Series EGC5. Titus Series 50F.

2.05 EXHAUST AIR INLETS

- A. Ceiling Exhaust Grille (CEG): Same as CRG.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install air outlets and inlets in locations indicated and so as to conform with building features and coordinated with other work. See hangers and supports specification Section for supports and additional requirements.
- B. Location Verification: Verify all air inlet/outlet locations with building features and other trades prior to installing any duct systems that will connect to the air outlets/inlets. For locations where air inlet/outlet location is noted to be verified, or location is not clear, develop shop drawings showing the proposed location, or the location that best suits field conditions, and submit for review.
- C. Connections: Furnish all necessary screws, clips, duct collars, and transitions required to allow for the installation and connection of ductwork to all air outlets/inlets. Connect all ductwork to air inlets and outlets with fasteners, minimum one each side and in compliance with SMACNA-DCS. See ductwork specification Section for sealing and additional requirements.
- D. Painting:
 - 1. Paint ductwork and accessories which are visible behind air outlets and inlets flat black. Painting to include ductwork, duct liner, turning vanes, liner attachments, and all visible items (including fastening pins for duct lining).
 - 2. Coordinate with the Division 09 Contractor for any necessary painting of air outlets/inlets/louvers prior to installation.

END OF SECTION 23 37 00

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. General requirements specifically applicable to Division 26 in addition to provisions of General Conditions, Supplementary Conditions, and Division 01.

1.02 SCOPE OF ELECTRICAL WORK

- A. Provide electrical systems and Work described, identified, specified, referenced, and shown in the Project Documents that are covered under Division 26 of the Construction Specifications Institute (CSI) and/or as otherwise regulated by national, state, and local electrical codes. Electrical Work includes providing all equipment, materials, devices, appurtenances, and accessories necessary to provide complete and operating systems according to the intent of Project Documents.
- B. Electrical work is not limited to Division 26 specifications and what is shown on the electrical drawings. The Contractor is responsible to review all Project Documents for additional Electrical Work and requirements and to include this work as part of their scope under the Contract.

1.03 REGULATORY REQUIREMENTS

- A. Comply with requirements of the following codes as adopted and supplemented by authority having jurisdiction:
 - ANSI/NFPA 70 - National Electric Code (NEC)
 - NFPA 101 - Life Safety Code
 - International Building Code (IBC)
 - International Mechanical Code (IMC)
 - WAC 296-46B - Washington State Electrical Safety Standards, Administration, and Installation
 - Washington State Energy Code (WSEC)
- B. Comply with additional codes and regulations referenced in other sections.
- C. Comply with additional codes and regulations required by authority having jurisdiction.
- D. Obtain and pay for permits, and inspections from authorities having jurisdiction over work included under applicable Division Sections.
- E. Include all testing, shop drawings, and documentation required by the inspection authorities for permitting and final approval.

1.04 SUBMITTALS

- A. Comply with requirements of Division 01. Unless otherwise specified, furnish product data and shop drawings to Architect/Engineer as follows:
 - 1. Product information sheets shall be neat, readable, 8.5 x 11 inch, submitted in PDF format. Generic product sheets with multiple products or product descriptions shall clearly highlight or otherwise indicate which product is being furnished.

2. Furnish product submittals with index tabs between categories or in separate submittals that correspond to each section of the specifications. Transmittal shall indicate name of the Project, Owner, Architect, Engineer, Contractor, and Date of Submittal.
 3. Furnish system design shop drawings in PDF format. Title block shall include Project, Owner, Contractor, and Date of Submittal.
 4. Furnish product data and shop drawings specifically indicating any conflict or deviation from requirements of contract documents.
- B. Confirm dimensions, ratings, and specifications of electrical materials, devices, fixtures, and equipment conform to project requirements prior to furnishing submittals. Coordinate electrical requirements with utilization equipment submitted under other sections and verify that voltage, phase, and rating are compatible with work shown in the electrical project documents.
- C. Provide shop drawings showing proposed feeder and branch circuit wiring plan required under Section 26 05 00.
- D. Do not order materials or commence Work until applicable submittal has been reviewed and the Architect/Engineer has approved or taken other appropriate action.

1.05 SUBSTITUTIONS

- A. Comply with requirements of Division 01. Products specified by naming one or more manufacturers establishes a basis for quality, styling, capacity, and function. Unless otherwise specified, written requests for substitution must be received at least 14 days prior to Bid Opening by Architect/Engineer who will determine acceptability of proposed substitution. Written acceptance must be obtained from Architect/Engineer prior to Bid Opening.
- B. Substitution requests may be submitted for any manufacturer or named product unless specified as "no substitute".
- C. Substitution approval does not relieve the Contractor of complying with the work requirements or the concept and intent of the project documents. Pay for any and all additional project costs that may be caused by Contractor requested substitutions, regardless of whether or not additional costs are overlooked, missed, or unforeseen, and regardless of when substitutions may be approved.

1.06 RECORD DOCUMENTS

- A. Comply with requirements of Division 01. Maintain at project site one set of clean, dry, and legible red-lined record drawings for submittal at Contract Close-out. Record information concurrently with construction progress.
- B. Indicate electrical changes in the contract documents. Include change orders, revised branch circuit and feeder wiring layouts, revised circuit identification, pull & junction boxes added during construction, and actual dimensioned location and routing of each underground conduit on record drawings.

1.07 LABELING

- A. Where labeling that includes room names and numbers is required for any system to identify devices or for programming purposes, use final room names and numbers determined during construction. Verify room names and numbers with Architect prior to manufacturing labels or programming software.

1.08 OPERATION AND MAINTENANCE MANUALS

- A. Comply with requirements of Division 01. Unless otherwise specified, furnish one labeled CD in PDF format and two duplicate hard copy printed sets of Operation and Maintenance Manuals prior to completion of contract. Submit hard copy manuals in labeled and indexed 3-ring binder(s).
- B. Include the following information as applicable:
 - 1. Names, addresses, and telephone numbers of the contractor, the installing sub-contractor, and the local representative for each system or equipment.
 - 2. All approved product data and shop drawings.
 - 3. Identify all manufacturer warranties which exceed one year.
 - 4. Model number and serial number of each piece of equipment provided.
 - 5. Data from test results performed under the Contract.
- C. Operation and maintenance data shall include complete parts lists, installation and maintenance instructions, safety precautions, operation sequence describing start- up, operation, and shut-down, internal and interconnecting wiring and control diagrams with data to explain detailed operation and control, and testing methods for each system and item of equipment.
- D. Furnish a draft copy of Operations and Maintenance Manual for Architect/Engineer review and incorporate comments prior to final submittal. Allow 14 days for Architect/Engineer review.

1.09 CONFLICTS

- A. Notify the Architect/Engineer of any conflicts or discrepancies before proceeding with any work or the purchasing of any materials related to the conflict or discrepancy until requesting and obtaining written instructions from the Architect/Engineer on how to proceed. Where conflicts occur, the most expensive and stringent requirement as judged by the Architect/Engineer shall prevail. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed shall be done at the Contractor's expense.

1.10 WARRANTY

- A. In addition to requirements covered under General Conditions or Division 01, include manufacturer product warranties that exceed one year. Assemble or list warranties that exceed one year in Operation and Maintenance Manuals indicating start date. Certificates of extended warranty shall identify the Owner as the beneficiary.

- B. If the Electrical Contractor does not have offices located within 150 miles of the project, provide a service/warranty work agreement with a local electrical subcontractor approved by the Owner. The service/warranty work agreement shall extend for the contract warranty period, and a copy shall be included in the Operation and Maintenance Manuals.

1.11 INTENT OF PROJECT DOCUMENTS

- A. Drawings and specifications are complementary and what is called for in either is binding as if called for in both.
- B. The drawings are diagrammatic and show the general arrangement of the construction and do not attempt to show all features of work, exact construction details, or actual routing of conduit and cable. Provide all necessary supports, off-sets, bends, risers, fittings, boxes, wiring, and accessories which are required for a complete and operating installation. Determine locations for required electrical outlets and connections prior to rough-in base on equipment product and installation submittal data and/or review of equipment on site.
- C. The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed to perform the Work shall be provided by the Contractor. All design by the Contractor shall be performed by individuals skilled and experienced in such work, and where required by local code (or elsewhere in the documents) shall be performed by engineers licensed in the State where the project is located. Include in bid the costs of all such project design; including engineering, drafting, coordination, and all related activities and work. Contractor provided design services shall be included for but not limited to bidder design specifications, temporary electrical systems, layout routing to install the Work and share project space with other building systems, hanger and support systems, seismic bracing, preparation of shop drawings, locating and identifying requirements for equipment and fixture terminations, and methods/means of accomplishing the work.

1.12 COORDINATION

- A. Examine architectural, civil, structural, and mechanical drawings and specifications and consult with other trades, as required to coordinate use of Project space and sequence of installation.
- B. Arrange wiring and equipment to avoid interference with other work and to maximize accessibility for maintenance and repairs.
- C. Coordinate with suppliers and installers to obtain product electrical data, shop drawings, and installation requirements for systems, equipment, and products furnished by Owner and/or other trades as required perform electrical work.
- D. Contractor is responsible ensure that equipment, fixtures, and devices being furnished and installed shall fit the space available, taking into account connections, service access, and clearances required by product manufacturer and/or Code. Contractor shall make the necessary field measurements to ascertain the space requirements for proper installation, and shall furnish and/or install equipment so that final installation meets the intent of the Project Documents. If approval is received by Addendum or Change Order to use other than the originally specified items, Contractor shall be responsible for specified capacities and for ensuring that items to be furnished will fit the space available.

- E. Contractor is responsible to review all the Project Documents and approved shop drawings provide under other divisions to identify and resolve conflicts between electrical systems and building construction, equipment, cabinets, counters, trim, and special finishes, prior to rough-in.
- F. Facilitate coordination between low voltage system sub-contractors during construction. Include time for a minimum of one meeting with all sub-contractors prior to building rough-in to review requirements for each system per Section 26 05 30. Include a second meeting with all sub-contractors to review requirements for all systems utilizing IP structured cabling prior to cover.

1.13 REQUIREMENTS FOR EQUIPMENT FURNISHED UNDER OTHER SECTIONS OR BY OWNER

- A. Provide power wiring, disconnect switches, electrical connection of equipment, installation of furnished electrical controllers, parts, and accessories, and field wiring for systems, equipment, and products furnished under other divisions or by Owner. Install controllers, operator stations, and control devices such as limit and temperature switches furnished with equipment.
- B. Review equipment submittals prior to electrical rough-in and installation. Verify location, rating, size, type of connections, and required space requirements. Coordinate field wiring requirements and details with supplier and installer. Notify Architect/Engineer of conflicts between requirements for actual equipment being furnished and equipment indicated in contract documents prior to commencing Work.
- C. Provide motor controllers and operator stations unless otherwise indicated on the project drawings.
- D. Make final connections to equipment. Provide cord and plug where required for plug-in connection.
- E. Integrated automation systems covered under Division 25 are not included as part of electrical work.

1.14 DEFINITIONS

- A. Electrical terms used in these specifications are as defined in NEC Art. 100 unless otherwise noted.
- B. Abbreviations: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary.
- C. Accessible Ceiling: Signifies access that requires the removal of an access panel or similar removable obstruction.
- D. As Required: As necessary to form a safe, neat, and complete working installation (or product), fulfilling all the requirements of the specifications and drawings and in compliance with all codes.
- E. Concealed: Hidden from view as in walls, trenches, chases, furred spaces, crawl spaces, unfinished attics, and above suspended ceilings.
- F. Conduit: Includes conduit and tubing raceways.

- G. Coordinate: Accomplish the work with all others that are involved in the work by directly discussing the work with them, arranging and participating in special meetings with them to discuss and plan the work being done by each, obtaining and completing any necessary forms and documentation required for the work to proceed, reaching agreement on how parts of the work performed by each trade will be installed relative to each other both in physical location and in time sequence, exchanging all necessary information so as to allow the work to be accomplished with a united effort in accordance with the project requirements.
- H. Equipment Connection: Make branch circuit connection, mount and connect control devices as required. Provide disconnect and overcurrent protection when required by NEC and IMC, if not otherwise indicated or furnished with equipment.
- I. Exposed: Exposed to view in any room, hallway, passageway or outdoors.
- J. Finished Areas or Spaces: Areas and/or spaces receiving a finish coat of paint on one or more wall surface.
- K. Furnish: Obtain and/or prepare and deliver to the project.
- L. Indicated: Shown, scheduled, noted, or otherwise called out on the drawings.
- M. Install: Enter permanently into the project complete and ready for service.
- N. Open Cable or Wiring: Conductors above grade not installed in conduit or raceway.
- O. Panel: Distribution panelboard, lighting and appliance panelboard, load center, and/or low voltage cabinet.
- P. Provide: Furnish and install complete and ready for service.
- Q. Wiring: Conductors in raceway or an approved cable assembly.
- R. Verify: Obtain, by a means independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work.

1.15 SCHEDULE OF VALUES

- A. Provide Schedule of Values for use by Architect/Engineer to evaluate progress payment requests during construction.
- B. Submit Schedule of Values using the line items included at the end of this Section. Submit Schedule of Values for review and approval. Include additional line items as requested.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT

- A. General: Furnish only products that are new and free from defects with a manufacture date that is less than six months from date of installation. Where product and applicable software updates or upgrades are available from the manufacturer, furnish the latest version unless otherwise specified. Furnishing discontinued products and/or products of manufacturers who are no longer in business is not permitted.

- B. Listing and Labeling: Furnish and install only products that are listed and labeled by one or more of the following testing laboratories as approved by the Authority Having Jurisdiction:
 - Underwriter's Laboratories, Inc. (UL)
 - ETL Testing Laboratories, Inc. (ETL)
 - Factory Mutual (FM)
- C. Each specified product and system to be furnished shall be from a single approved manufacturer. Providing multiple product brands or manufacturers for each type or category, or for multiple units of the same specified product and/or system, is not permitted.
- D. Products shall be delivered, handled, and stored per manufacturer recommendations. Protect fixtures, materials, and equipment from rain, water, dust, dirt, snow, and damage. Do not install products that have marred, scratched, deformed, or otherwise damaged. Do not install products that have been wet or exposed to the weather prior to assembly and/or installation.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Electrical work shall conform to requirements of ANSI/NECA 1-2015, Standard Practice of Good Workmanship in Electrical Construction.

3.02 INSTALLATION

- A. Provide all electrical work as specified and shown in the Project Documents. Provide all labor, equipment, material, accessories, and testing for electrical systems complete and operating. Include all scaffolding, rigging, hoisting, and services necessary for delivery and installation of materials and equipment.
- B. Include all required software applications, licensing and associated system programming for electronic products. Provide all software to owner for onsite programming and interfacing.
- C. Provide as part of the Electrical Work all hangers, brackets, supports, framing, backing, accessories, incidentals, not specifically identified the project documents, but required to complete the system(s) in a safe and satisfactory working condition.
- D. Quantity of materials and layout of the Work shall be provided based on field measurement of the actual project conditions and shall not be based on plan dimensions.
- E. Provide all testing and documentation of electrical systems as required to demonstrate compliance with the Project Documents.
- F. Provide testing, documentation, and filing required to comply with commissioning requirements of Section C408 of the Energy Code. Include documentation in Operation and Maintenance Manuals.

3.03 CUTTING AND PATCHING

- A. Provide cutting and patching to complete electrical work and to provide openings in elements of Work for electrical penetrations. Comply with requirements of Division 01.

DIVISION 26 – Electrical

SECTION 26 01 00 – Electrical General Requirements

- B. Locate and execute cuts so as not to damage other work or weaken structural components. Core drill or saw cut rigid materials.
- C. Patch to restore to original condition. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION 26 01 00

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Demolition of systems applicable to Division 26.
- B. Requirements for remodeling applicable to Division 26.

1.02 EXISTING CONDITIONS

- A. The drawings show portions of existing electrical systems which are to remain, be removed, or be modified under the Contract. Concealed features of existing systems are based on field observation. No guarantee is made as to their correctness.
- B. Contractors shall visit the project site prior to bidding and become familiar with the existing conditions and all other factors which may affect the execution of the work. Include all costs related to existing site conditions in the initial bid proposal.
- C. Failure to visit the project site prior to bid does not relieve the Contractor of the responsibility to provide all required work and a complete installation within the intent of the Contract Documents.

1.03 POWER AND SIGNAL OUTAGES

- A. The facility will continue normal operations during the construction work. The Contractor shall schedule power outages with the Architect/Engineer in accordance with requirements of Division 01. Include coordination, identification of affected areas, work schedule, and re-energizing of electrical systems with minimal disruption to facility operations.
- B. Unscheduled power or signal outages to Owner occupied areas and systems essential to facility operation or life safety shall not be permitted at any time. In the event that the Contractor's work causes or contributes to a power outage or other system fault, the Contractor is responsible for immediately correcting the problem.
- C. Schedule power and signal outages for evenings, weekends, or holidays unless otherwise approved; include costs for overtime and work outside regular hours.
- D. Power outages that affect critical facility operations are not approved at any time. This may require some demolition and new construction to occur on or near equipment that is to remain energized. Contractor shall comply with applicable provisions of NFPA 70E and WAC 296 for energized work. Contractor shall be responsible to perform arc flash calculations to identify personal protective equipment (PPE) as required to perform the work.

1.04 FIRE ALARM SYSTEM

- A. Maintain and operate the existing fire alarm system during construction. Comply with alarm, incident response, and fire watch requirements of the Authorities Having Jurisdiction for all areas served by the system. Plan and provide fire watch and/or temporary wiring where new construction interrupts required system operation.
- B. Provide dust protection for installed smoke detectors located within the work area. Clean detectors after work is completed and dust protection is removed.

- C. Coordinate all planned shutdowns and tests of the fire alarm system with the Fire Department and Alarm Reporting Center. Notify the Alarm Reporting Center of false alarms that occur during construction as required to mitigate Fire Department response.
- D. Provide investigation, correction, and required repairs to the alarm system for false alarms and system trouble that occur during the project and for system failures caused by the Work. Fines and penalties for excessive false alarms that occur during the Project shall be the responsibility of the Contractor.
- E. The Owner shall provide reimbursement for expenses associated with false alarms, system trouble, and system failure if the contractor can satisfactorily demonstrate that the incidents are not related to the Project.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. New and Replacement Materials and Equipment: As specified in applicable sections, except product manufacture shall match existing for minor construction and for accessories to equipment that remains.
- B. Materials and Equipment for Patching: Match existing products.
- C. Access Panels: Standard flush metal door for drywall, masonry, or tile, with locks keyed to match electrical panels. Milcor Style M, except Style UFR for fire rated construction.
- D. In finished spaces provide surface metal raceway systems as specified in other sections where existing construction does not permit concealed installation.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Field verify wiring and cabling for existing power and signal systems back to source of supply as required to perform Work.
- B. Disconnect electrical systems in walls, floors, and ceilings being removed.
- C. Provide temporary wiring and connections to maintain existing systems interrupted by new construction.
- D. Carefully remove, store, and reinstall existing removable ceiling tiles where access to perform work is required.
- E. Carefully remove, store, and reinstall existing light fixtures where access to perform work is required. Provide additional fixture support and seismic bracing for reinstalled fixtures where required to meet current Code.
- F. Cut and Patch conduit penetrations and required holes to access work at walls.

3.02 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing systems to accommodate new construction. For selective demolition, refer to architectural and mechanical plans and include electrical demolition to support removal and replacement work not otherwise indicated in electrical drawings.

- B. Electrical demolition includes the disconnecting, removal, and disposal of fixtures, devices and equipment where indicated, along with associated wiring.
- C. The following shall be considered as abandoned unless otherwise indicated:
 - 1. Wiring to fixtures, devices, and equipment being removed or disconnected.
 - 2. Conduit containing conductors or cable that have been disconnected from a source of supply or left empty by the removal of conductors.
 - 3. Open conductors or cable that have been disconnected from a source of supply.
 - 4. Fixtures, devices, equipment, and outlets located in walls, ceilings, and floors indicated to be removed.
 - 5. Fixtures, devices, and equipment identified as being replaced.
- D. Remove abandoned wire and cable for power and signal systems to source of supply.
- E. Remove abandoned conduit, cable, and outlets where exposed and within accessible ceiling, attic, crawl, plenum, and opened wall spaces. Cut conduit flush with walls and floors; patch surfaces in finished spaces. Outdoors remove abandoned conduit and cable down to 24 inches below grade and restore site to its original grade and finish.
- F. Disconnect abandoned outlets and remove devices. Provide blank covers for abandoned outlet boxes in floors, walls, and hard ceilings to remain.
- G. Disconnect and remove abandoned switchboards, panelboards, distribution equipment, and electrical devices.
- H. Disconnect power to utilization equipment being removed or abandoned in place.
- I. Disconnect and remove abandoned light fixtures, including brackets, stems, hangers, pole base and other accessories.
- J. Repair adjacent construction and finishes damaged during demolition and extension work.
- K. Cut-in flush outlet boxes and fish conduit in existing construction of remodeled areas where conditions permit. Flexible conduit is approved where fishing of conduit is required. Where existing construction does not permit flush installation, use surface metal raceway.
- L. Extend existing outlet boxes as required to accommodate new surface treatments or to extend wiring with surface raceway.
- M. Maintain access to existing electrical systems to remain active. Modify installation or provide access panels as appropriate.
- N. Replace, modify or extend existing outlet boxes to meet volume requirements. Cut surfaces as required to replace (or modify) existing outlet boxes and to install supports for new boxes and fixtures and patch to match adjacent surface.
- O. Provide new supports for existing conduit and open cable accessed during construction and which is to remain or be reused, as required to comply with current Code. Comply with requirements of applicable signal system specifications for support of signal cables.

3.03 DISPOSITION OF MATERIALS

- A. Prior to start of demolition, coordinate with Owner to identify materials and equipment for salvage. Disconnect and remove items to be salvaged and deliver to an area on site

designated by the Owner. Disconnect, remove, and handle salvage material and equipment in a manner so as not to damage or otherwise render unusable.

- B. Materials and equipment removed and not reused or salvaged to the Owner shall become the property of the Contractor unless otherwise indicated. Remove such material and equipment from the Owner's property and dispose legally off site.

3.04 CLEANING AND REPAIR

- A. Luminaires: Clean interior and exterior surfaces, reflectors, and lens. Replace lamps and broken electrical parts.

3.05 NAMEPLATES AND CIRCUIT DIRECTORIES

- A. Provide nameplates for existing distribution equipment to indicate new and revised equipment, circuit, and load designations.
- B. Update panelboard and load center circuit directories to indicate changes and additions to each circuit. Updated and existing circuits shall be typewritten on new removable circuit index cards.
- C. Nameplates and circuit directories shall comply with requirements of Section 26 20 00.

END OF SECTION 26 04 00

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Conduit and Fittings.
- B. Building Wire and Cable.
- C. Wiring Connections and Terminations.
- D. Boxes.
- E. Wiring Devices.
- F. Supporting Devices.
- G. Single Station Smoke Detectors.
- H. Requirements for Fire Rated Construction.

1.02 SUBMITTALS

- A. Submit product data for conduit fittings, wire and cable, watertight connectors, wiring devices, floor boxes, cord reels, smoke detectors, and cable tray.

1.03 OPERATION AND MAINTENANCE DATA

- A. Include data for wiring devices, floor boxes, smoke detectors, and cable tray in Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 CONDUIT

- A. Rigid Steel Conduit (RGS): ANSI C80.1; hot dipped galvanized.
- B. Intermediate Metal Conduit (IMC): Hot dipped galvanized.
- C. Electric Metallic Tubing (EMT): ANSI C80.3; galvanized tubing.
- D. Flexible Metal Conduit: Galvanized steel. Heavy wall except reduced wall may be used where concealed in building construction.
- E. Liquid Tight Flexible Metal Conduit: Galvanized steel, PVC jacket.
- F. Non-Metallic Conduit: NEMA TC 2; EPC-40-PVC.

2.02 FITTINGS

- A. RGS and IMC Conduit: ANSI/NEMA FB 1; threaded type. Provide bushings, hubs and connectors with insulated throat, for conduit terminations.
- B. EMT Conduit: ANSI/NEMA FB 1; steel, compression type. Crimp-on, drive-on, indenter, and set screw type prohibited. Provide connectors with insulated throat for conduit larger than 3/4 inch diameter.
- C. Flexible Conduit: ANSI/NEMA FB 1; steel, single screw squeeze type.
- D. Liquid tight Flexible Conduit: ANSI C33.84, steel. Provide PVC coated fitting where installed outdoors.

- E. PVC Conduit: NEMA TC 3; solvent welded type, same manufacture as conduit. Provide bushings, hubs and connectors with insulated throat, for conduit terminations.
- F. Water and Vapor Conduit Sealants: Hydra-Seal S-50 conduit sealing putty or approved; Tyco/Rachem/TE blank duct plug or approved; Polywater FST conduit sealing foam system or approved.

2.03 WIRE AND CABLE

- A. Copper Building Wire, Interior: Type THWN-2, 600 volt insulation; conductors 8 AWG and larger shall be stranded. Type XHHW-2 may be substituted for conductor sizes 4 AWG and larger.
- B. Fire Rated Building Wire: Type RHH or RHW-2, UL2196, 600 volt insulation, copper conductor, UL classified 2-hour rated cable when installed in approved steel conduit system. Type RHH may be used only in dry locations.
- C. Metal Clad (MC Cable): UL 1569; #12 AWG copper conductors, 600 volt 90 degree C rated conductor insulation, phase identified, with green insulated copper grounding conductor and steel outer covering. Include neutral conductor for switch legs per NEC 404.2(C). Provide PVC jacketed MC cable listed for the purpose where used in damp or wet locations or where otherwise indicated.

2.04 WIRE CONNECTORS

- A. Connectors for Wire Size 10 AWG and Smaller: Insulated steel spring twist-on pressure connector with plastic cap. Outdoors use watertight type with prefilled sealant gel.
- B. Connectors for Wire Size 8 AWG and Larger: Solderless mechanical or compression type with pre-formed or shrink sleeve insulated cover. Outdoors make watertight using shrink sleeve or pigtail cap and sealing mastic.
- C. Outdoor Taps Below Grade for Wire Size #6 AWG and Larger: IlSCO PED series underground multi-tap, wire range and number of ports as required.
- D. Gutter/Wireway Taps for Wire Size #6 AWG and Larger: IlSCO type PDB series AL/CU lug type distribution block, number of poles and quantity/size of primary/secondary lug ports as required for the application.

2.05 BOXES

- A. Outlet Boxes: ANSI/NEMA OS 1; galvanized sheet steel, with ½-inch male fixture studs or plaster rings as required.
- B. Surface Outlet Boxes Below 8 Feet: Cast aluminum or malleable iron, threaded hubs.
- C. Surface Outlet Boxes for Outdoor and Wet Locations: Gasketed cover, stainless steel hardware. Outlet boxes shall have threaded hubs.
- D. Concrete and Masonry Boxes: Galvanized steel, suitable for the purpose.
- E. Junction and Pull Boxes: Outlet box with blank cover except boxes larger than 4 inch square shall be screw cover type, galvanized steel with grey enamel finish, NEMA 1 indoors and NEMA 3R outdoors, unless otherwise indicated.

- F. Barriers: Provide permanent barriers in outlet boxes to separate adjacent wiring devices where voltage exceeds 300 volts. Provide permanent voltage separation barriers in outlet and junction boxes to separate wiring above 100 volts from wiring below 100 volts and where otherwise required by Code.
- G. Color Coding of Device and Junction Boxes for Special Systems: Field painted or otherwise manufactured in the specified color, both inside and outside of box and cover. Provide color identification for the following electrical systems: Fire Alarm System - RED, Emergency Systems (NEC 700) - ORANGE.

2.06 WIRING DEVICES

- A. Wall Switches: Hubbell 1221, Leviton 1221, Pass & Seymour 20AC1, Cooper 2221; specification grade, 20 ampere, 277 volt, quiet type. Single pole, double pole, 3-way, 4-way as required. Color: Ivory.
- B. Duplex Receptacles: Specification grade 5362 series, NEMA 5-20R, grounding type, as manufactured by Hubbell, Leviton, Pass & Seymour, Cooper. Color: Ivory.
- C. Receptacle assemblies face up located in Counter Tops and Work Surfaces: Same manufacturer, rating, and style as specified for duplex or GFCI receptacles except receptacle assemblies shall be listed for the application.
- D. Ground Fault Circuit Interrupter (GFCI) Receptacles: Same manufacture, rating, and color as duplex receptacles except devices shall comply with UL 943, Class A, with self test.
- E. Duplex Receptacles, Weather Resistant for Damp and Wet Locations: Same manufacture, rating, and color as duplex and GFCI receptacles except devices shall be UL listed as weather resistant and permanent special purpose identification shall be visible on the device.
- F. Special Purpose Receptacles: NEMA WD 5, same manufacture as duplex receptacles; premium specification grade, grounding type, NEMA configuration as indicated on project plans, black color. Provide matching plug for each receptacle.
- G. Flush Mounted Device Plates: Super heavy duty for high abuse application, rigid high impact thermoplastic, smooth finish, color to match device. Thermoset, phenolic, urea, nylon, and flexible polycarbonate not approved. Cooper PJ series manufacture or approved. Sierra type 302 stainless steel, satin finish.
- H. Surface Mounted Device Plates: Raised galvanized steel on steel boxes; cast or stamped sheet aluminum on cast boxes.
- I. Damp and Wet Location Device Plates: ANSI/UL 514D; Commercial grade, low profile, lockable, die cast metal cover assembly, listed as weatherproof when in use and identified as extra duty. Hubbell/TayMac MX series or approved.

2.07 SUPPORTING DEVICES

- A. Metal Conduit Clamps and Straps: Steel, screw type; zinc or cadmium plated minimum indoors, hot dipped galvanized minimum outdoors.
- B. Support Channel: Slotted 12-gauge steel channel with fittings, fasteners, brackets, clamps, floor plates, and accessories required; Pre-galvanized zinc coated (G90) indoors, ASTM 123 hot dipped galvanized outdoors.

- C. Fasteners: Expansion anchors in concrete and solid masonry; toggle bolts in hollow masonry, plaster, or gypsum board wall construction; sheet metal screws in metal construction; wood screws in wood construction; set screw type beam clamps on steel columns and beams; U.L. listed clips for metal studs. Metal parts and accessories to be zinc or cadmium plated minimum indoors and hot dipped galvanized minimum outdoors.

2.08 ACCESSORIES

- A. Pulling Wire:
 - 1. Interior; continuous fiber pulling line, 190# tensile strength.
 - 2. Below grade; Polyester measuring pulling tape 5/8 inch wide, 1800# tensile strength. Muletape.
- B. Corrosion Protection Metal Conduit Tape: 3M Scotchrap 10 mill PVC All Weather Corrosion Protection 50 tape and pipe primer system, or approved.

2.09 SINGLE STATION SMOKE AND CARBON MONOXIDE (CO) DETECTORS

- A. UL 217, UL 2034; 120 VAC direct wired combination ionization smoke and CO detector with battery back-up, integral horn rated 80 dB minimum at 10 feet, power-on LED, test switch, automatic reset, and white housing. Detector shall be capable of interconnecting with additional units for common alarm. Non combination devices may be used when approved or otherwise required. BRK/First Alert, Kidde, or approved.

2.10 FIRE RATED CONSTRUCTION

- A. Products for Fire Stopping to Seal Around Enclosures and Annular Space between Conduit and Building Construction at Conduit Penetrations: ANSI/UL 1479; Comply with requirements of Division 07.
- B. Conduit Sleeves for Open Cable: ANSI/UL 1479; Fire stop conduit sleeve kit, with mounting escutcheons, gaskets, end bushings, warning labels, and non-hardening fire stop putty. SpecSeal READY SLEEVE, FS100 (1 inch diameter sleeve) and FS200 (2 inch diameter sleeve), or approved.
- C. Pathway Sleeves for Open Cable, Greater than 2 Inch Diameter: ANSI/UL1497; Fire stop rectangular sleeve kit, 3-inch wide by 3-inch high by 10.5-inch length, expandable in 6-inch increments, self-contained integral fire sealing system that automatically adjusts to the installed cable loading. Provide radius control modules (each end of pathway), single or multiple gang wall kits, and expansion modules as required. Specified Technologies, Inc., EZ-Path System Series 33 or approved.

PART 3 - EXECUTION

3.01 WIRING METHODS

- A. General:
 - 1. Fixed wiring shall be conductors installed in conduit.
 - 2. Conceal all wiring within construction unless otherwise noted on drawings or specifically authorized by the Architect/Engineer.

3. Where contractor wiring methods require the application of conductor ampacity adjustment or correction factors under NEC 310.15, the contractor shall submit calculations that show Code compliance, except the adjusted ampacity of the conductors installed shall not be less than the circuit overcurrent device rating shown or specified.
 4. Conduit sizes shall not be reduced to smaller size than shown or otherwise noted on plans.
 5. Feeders shown or otherwise noted on plans shall not be combined to share a common conduit homerun. Branch circuit homeruns shown or otherwise noted on plans shall not be combined to share a common conduit with other circuits.
 6. Device Plates: It is the electrical contractor's responsibility to ensure that all line voltage and low voltage system faceplates and visible trim pieces are the same color. Exception: Where stainless steel device plates are used for line voltage systems, low voltage systems may use non-metallic plates of the same color.
- B. Conduit Requirements:
1. Rigid Steel Conduit (RGS): May be used in all areas. Required at penetrations thru fire rated construction rated greater than 1 hour.
 2. Intermediate Metal Conduit (IMC): May be used in all areas except where RGS is required or indicated.
 3. Electrical Metallic Tubing (EMT): May be used in dry and damp locations where not subject to damage. May not be used in concrete, where in contact with earth, or where RGS is required or indicated. May not be used for service entrance conductors inside a building. Maximum trade size 2 inches.
 4. Flexible Conduit: May be used concealed in casework, up to 1 inch maximum trade size. Required for final equipment connections (maximum length 36 inches), to recessed lighting fixtures from an outlet box (maximum length 72 inches), and where raceway passes thru seismic joints. Use liquid tight in damp or wet locations.
 5. Rigid Non-Metallic Conduit (PVC): May be used underground. May be used within buildings where encased in not less than 2 inches of concrete. Terminate inside building using RGS or IMC elbow and riser to first coupling above slab on grade.
- C. Wire and Cable Requirements:
1. Use copper conductors.

3.02 SUPPORT - GENERAL

- A. Support wiring, conduit, raceways, boxes, equipment, and fixtures from building structural members. Provide additional framing, channel, or listed support attachments as required to span or support between structural members and to avoid interference from pipes, ducts, and other equipment.
- B. Do not install support anchors to penetrate thru roof deck.
- C. Do not violate the integrity or exceed the capacity of the building structure used for support. Provide/fabricate additional support elements to transmit loads to the floor or other parts of the building structure that can carry the load as approved by the Architect/Engineer.

3.03 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. Minimum conduit trade size 1/2-inch diameter except all homeruns and where installed below grade outdoors conduits shall be 3/4-inch minimum diameter. Prewired 3/8 inch diameter flexible conduit not to exceed 72 inches in length may be used for fixture whips from an outlet box to recessed light fixture.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route conduit parallel and perpendicular to walls and adjacent piping.
- D. Maintain 12-inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- E. Locate holes in joists within center third of member depth measured from the edge and at least 24 inches from load bearing points. Maximum hole diameter one inch.
- F. Support conduits from building structure with conduit straps or rods and hangers. #8 solid wire and CADDY clips may be used to hang 3/4-inch diameter conduit and smaller above accessible ceiling spaces.
- G. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- H. Do not support conduit with perforated pipe straps or tie wraps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- I. Do not bore holes in truss members or notch structural members.
- J. Steel conduit installed as part of a 2 hour fire rated wiring assembly shall be supported 5 feet on center where required by the cable system installation requirements.

3.04 CONDUIT INSTALLATION

- A. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp locations.
- B. Use conduit bodies to make sharp changes in direction, as around beams.
- C. Use factory elbows for PVC conduit and for bends in metal conduit larger than 1 inch. Conduit bends for signal systems that are greater than 45 degrees shall be minimum radius sweeps as follows:

| | |
|---------------------|-----------------|
| Under 2 inches | Standard radius |
| 2 inches - 3 inches | 24 inch radius |
| Over 3 inches | 36 inch radius |
- D. Install pull wire in empty conduits.
- E. Install flexible conduit thru oversized bushed sleeve or cored opening where conduit crosses building wall expansion or seismic joints. Provide up to 54 inches of flexible wiring with 6 inches minimum of conduit slack each side of the wall assembly to allow for free movement across the joint.

3.05 CONDUIT PENETRATIONS

- A. Interior Walls and Partitions: Cut one size larger than conduit diameter. Seal all openings at each penetration with low VOC level general purpose interior sealant as specified in Division 07.
- B. Fire Rated Construction: Comply with requirements of paragraph, FIRE RATED CONSTRUCTION, this specification.

3.06 CONDUCTOR INSTALLATION

- A. Minimum Conductor Size: #12 AWG, except #10 AWG minimum for outdoor and exterior building lighting circuits and #14 AWG minimum for control circuits and for lighting fixture taps not to exceed 72 inches.
- B. Splice conductors only in junction or outlet boxes.
- C. Arrange conductors neatly at termination such that a clamp-on ammeter may be used.
- D. Clean conduit free of debris before conductor installation; install conductors using pulling lubricant.

3.07 CONDUCTOR IDENTIFICATION

- A. Provide non-metallic wire markers on each conductor in panelboards and in junction boxes having more than 6 conductors. Identify branch circuit or feeder number for power and lighting circuits.
- B. Color Coding of Insulated Equipment Ground: Solid green.
- C. Color Coding of 208/120 Volt System: Phase A - black, Phase B - red, Phase C - blue, Neutral - white.
- D. Color Coding of 480/277 Volt System: Phase A - brown, Phase B - orange Phase C - yellow, Neutral - gray.

3.08 BOX LOCATIONS

- A. Provide electrical boxes for outlets, junctions and equipment connections as shown and as required for splices, taps, wire pulling, and code compliance.
- B. Electrical box locations shown are approximate unless dimensioned. Obtain equipment outlet locations from equipment manufacturer prior to rough-in. Coordinate outlet and wall switch locations with casework and finish elements shown on Architectural drawings. Install to fit conditions or as directed.
- C. Change location of wall outlets, wall switches, and lighting outlets up to fifteen feet without charge when requested by Architect/Engineer prior to installation.
- D. Height of outlets unless otherwise directed: See Drawings.

3.09 BOX INSTALLATION

- A. Set wall outlet and wall switch boxes vertically.
- B. Support boxes independently of conduit, piping, and ductwork; securely fasten in place.
- C. Provide recessed outlet boxes in finished areas. Flush front edge of box or plaster ring even with finished surface.

- D. Provide blank cover plate over all boxes that do not contain devices or are not covered by equipment.
- E. Do not install flush boxes on opposite sides of a wall within the same stud space. Maintain 24 inch minimum box separation in fire rated wall assemblies.

3.10 WIRING DEVICES

- A. Ground Fault Circuit Interrupter (GFCI) Protection: Provide for receptacles located outdoors, within 6 feet of sinks, in bathrooms, kitchens, indoor wet locations, locker rooms with associated shower facilities, elevator pits, elevator machine rooms, crawl spaces, garages, service bays, rooftops, at counters and work surfaces where food and/or beverage preparation occurs, water coolers, and as otherwise indicated. GFCI receptacles are not required where branch circuit is protected by GFCI circuit breaker.
- B. Ground Fault Circuit Interrupter (GFCI) Protection, Dwelling Units: Provide for receptacles located outdoors, within 6 feet of sinks, in bathrooms, indoor wet locations, crawl spaces, unfinished basements, garages and accessory buildings, at kitchen counters and work surfaces where food and/or beverage preparation occurs, water coolers, and as otherwise indicated. GFCI receptacles are not required where branch circuit is protected by GFCI circuit breaker.

3.11 SINGLE STATION SMOKE DETECTORS

- A. Install in accordance with manufacturer's instructions.

3.12 FIRE RATED CONSTRUCTION

- A. Verify location of fire rated walls and ceilings with Architectural plans prior to rough-in.
- B. Installation of boxes, rough-in cans, conduits, and sleeves that result in membrane or through penetrations shall comply with IBC 712.1 through 712.4 as required to maintain fire rating of construction assembly. Coordinate locations and construction requirements with General Contractor.
- C. Provide approved conduit and/or pathway sleeve kits for installation of open cable through fire rated construction.

3.13 LABELING

- A. Outlets: Identify panel and circuit number on faceplate of convenience and special purpose outlets. Use self-adhesive, polyester or vinyl laminated labels with machine generated alpha-numeric circuit identification, 1/4 inch high black letters on clear background. Exception: Use white letters on black or brown color device plates.
- B. Junction Boxes: Label or mark cover with panel and circuit number. Locate on inside of cover except locate on outside of junction box cover in attics, crawl spaces, equipment rooms and above accessible ceilings.

3.14 TESTS

- A. Perform continuity test on all feeder and branch circuit conductors. Verify proper phasing and that no short circuits or accidental grounds exist.
- B. Check all convenience outlets for correct wiring connections using a polarity circuit tester. Test AFCI and GFCI circuits for proper operation with an approved tester.

- C. Torque test conductor lug terminations to manufacturers recommended values.
1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Ground Impedance: Values of up to 2 ohms are acceptable.
 3. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 4. Receptacle Polarity Test: Test every receptacle installed or reconnected under this contract with a receptacle circuit tester. Tester shall test for open ground, reverse polarity, open hot, open neutral, hot and ground reversed, hot or neutral and hot open. Rewire receptacles with faults and retest. Submit statement of completed testing signed by the electrician that performed the test.
 5. Ground-Fault Receptacle Circuit Interrupter Tests: Test each receptacle or branch circuit breaker having ground-fault circuit protection to assure that the ground-fault circuit interrupter will not operate when subjected to a ground-fault current of less than 4 milliamperes and will operate when subjected to a ground-fault current exceeding 6 milliamperes. Perform testing using an instrument specifically designed and manufactured for testing ground-fault circuit interrupters. Apply the test to the receptacle. "TEST" button operation will not be acceptable as a substitute for this test. Replace receptacles that do not shutoff power with 7/1000 of an ampere within 1/40th of a second and retest.
 6. Using the test plug, verify that the device and its outlet box are securely mounted.
 7. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 26 05 00

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Manual Controls.
- B. Occupancy Sensors.

1.02 RELATED SECTIONS

- A. Section 26 50 00 - Lighting Fixtures.

1.03 SUBMITTALS

- A. Submit product data for all products and associated components specified under Part 2 of this section.

1.04 OPERATION AND MAINTENANCE DATA

- A. Include submittal data, shop drawings, installation and operating instructions, commissioning and test reports, and warranties that exceed one year in Operations and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. 0-10 VDC Wall Box Dimmers: Lutron Diva series or approved.
- B. Line Voltage Photocells: General Electric, Intermatic, Tork.
- C. Occupancy Sensors: Greengate, Sensor Switch, WattStopper.
- D. Digital Room Controllers, Sensors, and Wall Stations: Greengate, LC&D, nLight, WattStopper.

2.02 MANUAL CONTROLS

- A. Line Voltage Switches: Provide as specified under Section 26 05 00 for wiring devices.
- B. Low Voltage Switches: Heavy duty, 3-position, momentary contact, toggle switch, rated 3 amperes at 25 VAC. Two wire, single relay control switches shall include integral diodes for transformer/relay operation as required. Color: Match wiring devices specified under Section 26 05 00.
- C. 0-10VDC Wall Box Dimmer: Architectural line voltage on/off switch with low voltage preset linear slide dimming control feature, 120/277 volt, 8 amp minimum switching load capacity, 50 milliamp minimum 0-10VDC sink capacity, UL listed for use with fixture type, driver, and/or dimming ballast provided, single pole or 3-way as indicated, suitable for use with decora style wall plates Color: Match wiring devices specified under Section 26 05 00.
- D. Digital Wall Stations: Low voltage, local network, manual switch station with feed thru RJ45 ports, suitable for use with decora style wall plates. Provide On/Off, On/Off/Dim, and/or multi-pushbutton On/Off/Scene/Dim switch stations as indicated. Color: Match wiring devices specified under Section 26 05 00.

- E. Switch Plates: Match material and finish of device plates specified in Section 26 05 00.

2.03 OCCUPANCY SENSORS

A. Room Sensors:

1. Dual technology (ultrasonic/passive infrared) 24VDC occupancy detector, adjustable sensitivity and time delay, manual override, LED motion indicator, compatible with fluorescent electronic ballasts. Rated area coverage shall conform to manufacturer's recommendation for complete room coverage without gaps, using single or multiple sensors as required. Sensors may be wall or ceiling mounted type. Exception: In restrooms and toilets with privacy partitions or showers, provide ultrasonic type without passive infrared feature.
2. Wire Guard: Provide in public restrooms, gymnasiums, locker rooms, and similar areas where sensor may be subject to abuse.

- B. Transformer/Relay Pack: 120/277 volt control interface providing NEC class 2 input/output to occupancy sensor(s) and automatic line voltage switch control. Relay contacts shall be isolated, normally open, rated 20 amperes for ballast loads and 1 HP. Provide auxiliary isolated dry contact set to allow for air temperature control (ATC) interface with the occupancy sensor control system; a slave relay may be provided for this purpose.

C. Wall Switch Sensors:

1. Passive infrared occupancy sensor, automatic OFF, manual ON/OFF, continuous self adapting sensitivity and time delay, LED motion indicator, compatible with magnetic ballast, electronic ballast, and motor loads, 170 degree minimum field of view. Minimum load rating shall be 600 VA and 1/6 HP at 120 volts and 1000 VA and 1/3 HP at 277 volts. Minimum rated area coverage shall be 900 square feet.
2. Finish: Match wiring devices and plates specified under Section 26 05 00.

- D. Outdoor Sensors: Digital passive infrared (PIR) occupancy sensor, outdoor rated (water tight, -41 to +160 degree F), 360 degree coverage, line voltage On/Off control, 0-10VDC output for dimming, integrated photo sensor, suitable for control of fluorescent, HID, and LED light fixtures, suitable for low and high mounting up to 30 feet above grade, with chase nipple for mounting to outlet box, light fixture, or pole, housing color as selected.

2.04 MATERIALS

- A. Low Voltage Wire: UL Type CL2, NEC Class 2 or better; multi-conductor, stranded copper cable, #20 AWG minimum, color coded.
- B. RS 485 Communications and Digital Control: UL type CMR, Category 5 extended frequency (350MHz), 24 AWG solid copper, 4-pair unshielded twisted pair, jacket overall, color coded. Cable installed below grade shall have a water blocking core and be suitable for wet locations in conduit.
- C. Conduit and Outlet Boxes: As specified under Section 26 05 00.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install lighting controls in accordance with manufacturer's instructions and approved shop

drawings. Provide programming, setup, and calibration for complete operation of each control system.

- B. Install low voltage wiring in conduit except cable may be installed without conduit above accessible ceilings. Install open cable parallel and perpendicular to building lines; support cable from structure at intervals not to exceed 4.5 feet on center. Do not splice open cable.

3.02 OCCUPANCY SENSORS

- A. Room Sensors: Provide number and location required for complete coverage within room (including toilet and shower stalls) and to minimize false activation thru open doors as recommended by manufacturer. Ceiling mounted sensors shall not be used above 12 feet. Provide additional transformer/relays or room controllers as required where multiple branch circuits are controlled.
- B. On/Off Operation: Wall switches and occupancy sensors shall be wired or otherwise programmed to provide manual on, manual off, and automatic sensor off control of room lighting unless otherwise indicated.
- C. Time Delay: Set manual time delay for automatic off at 15 minutes unless otherwise directed or indicated.

3.03 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of system to Owner's personnel prior to contract closeout. Allow one site visit and two hours of total instruction scheduled at convenience of Owner.
- B. Use operation and maintenance manuals as basis of instruction, reviewing contents of manual with personnel in detail.
- C. Follow-Up Training: Include a second site visit for training and programming adjustments between 6 months to one year of substantial completion scheduled at convenience of Owner.

END OF SECTION 26 09 20

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Interior Luminaires and Accessories.
- B. Lamps.
- C. Emergency Lighting Equipment.

1.02 RELATED SECTIONS

- A. Concrete for Bases: Comply with Division 03 - Concrete.

1.03 COORDINATION

- A. Confirm luminaire type, mounting, and recessed depth is compatible with ceiling system prior to ordering. Coordinate with architectural reflected ceiling plans, sections, and details.
- B. Determine final luminaire locations according to architectural reflected ceiling plans and elevations. In spaces open to structure, coordinate final luminaire locations and mounting heights with ductwork, piping, and structural members and submit final plan to Architect/Engineer for approval.
- C. Coordinate dimensions and mounting of under-cabinet and other casework lighting with the cabinet and/or casework product vendor(s) prior to ordering light fixtures.

1.04 SUBMITTALS

- A. Submit product data for all items specified under Part 2 of this section and scheduled on the drawings. Include in submittal and in Operations and Maintenance Manual a coversheet listing each fixture type with corresponding LED/lamp and driver/ballast data.
- B. Submit shop drawings for Emergency Lighting System UPS equipment.

1.05 OPERATION AND MAINTENANCE DATA AND TRAINING

- A. Submit all data in Operation and Maintenance Manuals.
- B. Provide onsite training on driver and LED board replacement for each type of luminaire installed.
- C. Lighting Inverter: Include instructions for normal operation, routine maintenance requirements, service manuals and testing procedures in Operation and Maintenance Manual. Provide onsite Owner training.
- D. Include documentation from system start up.

1.06 WARRANTY

- A. LED Luminaires and Fixture Ballasts: Provide five year comprehensive warranty.
- B. Lighting Inverters: Provide two year extended warranty with factory start up and onsite service.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Luminaires and Accessories: Identified in Fixture Schedule.

2.02 LED LUMINAIRES

- A. Indoor luminaires shall comply with following requirements unless otherwise scheduled on the drawings: UL listed, Reduction of Hazardous Substance (ROHS) compliant, 3500K color temperature, 80 CRI minimum, listed for 25 degree C minimum ambient operation, integral driver, integral surge, open circuit, short circuit, and overload protection, L70 at 50,000 hours or better per IESNA LM-80. Provide dimmable driver for low voltage 0-10 volt control to 10% of lumen output except dimming drivers that have daylight responsive control shall dim to completely OFF.
- B. Recessed LED luminaires shall have drivers, modules, and reflectors accessible, serviceable, and replaceable from below the ceiling.

2.03 FIXTURE WHIPS

- A. 3/8 inch flexible conduit or approved MC cable assembly with circuit and equipment ground conductors; 72 inch maximum length.
- B. Where fixtures are provided with pre-installed whips, verify wiring arrangement, termination location, and installation clearances prior to ordering.

2.04 FIXTURE ACCESSORIES

- A. Provide necessary hangers, brackets, plates, anchors, and other mounting accessories required by construction features and ceiling conditions. Comply with requirements of Section 26 05 00, Basic Materials and Methods.
- B. Allow sufficient length for pendants, cables, chains, conduit, or rods as specified to install hanging fixtures at 8 feet above finished floor or 36 inches below the ceiling, whichever is lower, unless otherwise indicated in the construction documents.

2.05 LIGHTING FIXTURE SCHEDULE

- A. See Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide LED modules/lamps in luminaires provided under this Section.
- B. Provide wiring, installation, and lamps for lighting fixtures furnished under other Sections or by Owner, including fixtures furnished as part of hoods and equipment (e.g. range hoods, kitchen hoods, fume hoods, and walk-in HVAC equipment). Incandescent lamps shall be maximum listed wattage of fixture except when smaller wattage is indicated.
- C. Set lighting fixtures plumb, square, and level; measure mounting heights to center of fixture for wall mounted and to bottom of fixture for pendant hung.

- D. Support lighting fixtures from building structural members; provide metal channels or additional blocking and framing as required for fixture support between structural members or to avoid interference from mechanical pipes and ducts. Conceal supports within building construction in finished spaces.
- E. Recessed and surface mounted lighting fixtures weighing less than 56 lbs (25.4 kg) may be supported from metal ceiling suspension systems when auxiliary support from structural members using two #12 AWG wire hangers at diagonal corners are provided (hangers may be slack). Fixtures weighing 56 lbs or more must be supported directly from the structure by approved hangers.
- F. Light fixtures hung below suspended ceilings by pendants, cables, chains, conduit, rods, or other means shall be supported from structure above using #9 AWG wire hanger or alternate support approved by Inspection Authorities.
- G. Securely fasten recessed and surface fixtures in place; provide seismic clips (one each corner) for lay-in fixtures; attach surface fixtures tight to ceilings and walls, and secure fluorescent fixtures within 12 inches of each end.
- H. Mounting height for wall mounted fixtures and for hanging fixtures supported by pendants, cable, chain, conduit, rods, or other means shall be determined by the architect/engineer during construction unless otherwise indicated in the construction documents.
- I. Prior to substantial completion and before testing and operating manual or automatic fluorescent dimming systems, operate fluorescent lamps at full brightness for the minimum hours recommended by the lamp manufacture to meet burn-in requirements.

3.02 RELAMPING

- A. Relamp luminaires which have failed lamps at completion of work.

3.03 ADJUSTING AND CLEANING

- A. Align and tighten luminaires and clean reflectors, lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Make final aiming adjustment of directional luminaires as directed by Architect/Engineer at completion of work.

3.04 EMERGENCY LIGHTING EQUIPMENT

- A. Exit, Self-Contained Emergency, Night lights: Connect ahead of switch control on local lighting circuit.
- B. Integral Emergency Lighting Pack for Fluorescent Lighting: Install in ballast channel with charging indicator light and test switch separately mounted on or adjacent to fixture so as to be visible and accessible. Connect emergency pack to unswitched conductor ahead of local switch control. Connect fixture ballast so that lamps are switched in normal mode unless fixture is indicated as Night Light.

3.05 FIRE RATED CONSTRUCTION

- A. Recessed Luminaires: Provide field fabricated fire resistive shell acceptable to Fire Marshal and conforming to requirements of UL assembly rating for ceiling installed. Allow clearances around fixture for adequate ventilation per fixture manufacturers recommendations and UL listing.

3.06 THERMAL AND SOUND INSULATION

- A. Coordinate with General Contractor to ensure provisions are made to support insulation materials minimum of 3 inches clear of recessed lighting fixtures that are not IC rated.

3.07 TRAINING

- A. Coordinate with Architect to arrange onsite training for luminaire and lighting inverters. Allow 20 minutes per each type of installed luminaire to review driver and LED board replacement. Allow four hours of factory training for the lighting inverters.

END OF SECTION 26 50 00