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# PROJECT MANUAL

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For:

POA Flex Building

**PORT OF ARLINGTON, OREGON**

Date: December 12, 2017– Bid Set  
Project: 2017-015

**Port of Arlington  
100 Island Park Way  
Arlington, OR 97812**



*Professional Engineering  
and Project Management*

## TABLE OF CONTENTS

### Contract Documents

00 00 10	Cover Sheet
00 00 20	Table of Contents
00 01 00	Ad for Bid
00 02 00	Instructions to Bidders
00 04 10	Bid Form
00 04 20	Subcontractor Disclosure form
00 04 35	Bid Bond Damages Form
00 05 10	Notice of Award
00 05 20	Suggested Form of Agreement between Owner and Contractor
00 05 50	Notice to Proceed
00 05 60	Contractor's Completion Statement
00 06 10	Performance Bond
00 06 15	Payment Bond
00 06 20	Contractor's Application of Payment
00 06 25	Certificate of Substantial Completion
00 07 00	Standard General Conditions
00 08 00	Supplementary Conditions
00 09 41	Change Order
00 09 41A	Change Order Documentation
00 09 42	Field Order

### PWR Rates

00 10 10	Prevailing Rate Manual July 2017
00 10 20	Existing Site Conditions: Geotechnical Report
00 10 30	Existing Site Conditions: Survey & Record Drawings

### Specifications

01 10 00	Summary of Work
01 30 00	Administrative Requirements
01 40 00	Quality Requirements
01 42 00	References
01 50 00	Temporary Facilities and Controls
01 60 00	Product Requirements
01 70 00	Execution and Closeout Requirements
03 30 00	Cast-in-place concrete
05 50 00	Metal Fabrications
06 10 00	Rough Carpentry
06 16 00	Sheathing
07 21 00	Thermal Insulation
07 92 00	Joint Sealants
08 11 13	Hollow Metal Frames and Doors
08 14 16	Flush Wood Doors
08 36 13	Overhead Sectional Door
08 71 00	Door Hardware
08 80 00	Glazing
08 83 00	Mirrors
09 29 00	Gypsum Board

09 65 13	Resilient Base and Accessories
09 91 00	Painting
10 14 00	Signage
10 44 16	Fire Extinguisher
13 34 19	Pre-Engineered Metal Building System
22 05 00	Plumbing Materials and Methods
22 07 00	Plumbing Insulation
22 10 00	Plumbing Piping
22 30 00	Plumbing Equipment
22 40 00	Plumbing Fixtures
23 05 00	HVAC Materials and Methods
23 07 00	Mechanical Insulation
23 30 00	Air Distribution
26 05 00	Common Work Results for Electrical
26 05 19	Electrical Power Conductors and Cables
26 05 26	Grounding and Bonding
26 05 29	Hangers and Supports
26 05 33	Raceway and Boxes for Electrical Systems
26 05 53	Identification for Electrical Systems
26 07 40	Telephone and Data Provisions
26 20 00	Service Entrance
26 24 16	Panel Boards
26 27 26	Wiring Devices
26 28 00	Circuit Protective Devices (and disconnects)
26 50 00	Lighting
31 10 00	Site Clearing
31 20 00	Earth Moving
32 13 13	Concrete Paving

## ADVERTISEMENT FOR BIDS

Port of Arlington Oregon  
100 Island Park Way  
PO Box 279  
Arlington, OR 97812

Separate sealed **Bids** per ORS 290C.335 (competitive bid) for the **Flex Building** will be received by **Port of Arlington, Oregon, c/o Peter Mitchell, 100 Island Park Way, Arlington, OR 97812, until 2:00 p.m. (Pacific Prevailing Time) January 10, 2018. Bids will be publicly opened and read aloud at 2:05 p.m. (Pacific Prevailing Time), January 10, 2018,** in the Port of Arlington Office, 100 Island Park Way, Arlington, OR 97812. The work to be performed shall consist of providing all materials, labor, and equipment necessary:

1. Construction of new 6,000 SF pre-engineered metal building shell with limited interior tenant improvement
2. Associated site stripping, preparation, grading, PCC paving, curbs, driveway approach, landscaping, and sidewalks
3. Installation of new associated utilities including power, data, gas, water, and sanitary sewer
4. Minor site demolition and erosion & sediment control

**The engineer's construction cost opinion for this project is: \$650,000 for the base bid.**

Bid must be submitted on the Proposal form furnished by the **Port of Arlington** and included in the project manual and shall bear the signature of the Bidder. The **CONTRACT DOCUMENTS** may be obtained by request from:

1. Electronic Format:
  - a. Pillar Consulting Group, Inc., 135 S Main ST, Suite 206, Condon, OR 97823 [jeff@pillar-inc.com](mailto:jeff@pillar-inc.com) 541-993-2480
2. Hard Format (at bidder's expense)
  - a. Salem Printing and Blueprinting, Corvallis, OR 541-738-7023
3. Plans may be inspected at the following locations:
  - a. Port of Arlington, 100 Island Park Way, Arlington, OR 97812. 541-454-2868. By appointment.
  - b. DJC Plan Center, Portland, OR 97205; 503-274-0624
  - c. Premier Builder's Exchange, Bend, OR 97701. 541-389-0123
  - d. Hermiston Plan Center, Hermiston, OR 97838. 541-564-0420
  - e. Contractor Plan Center, Inc., Milwaukee, OR 97222. 503-650-0148.
  - f. Salem Contractor Exchange, Salem, OR 97302 503-362-7957.
  - g. Tri-City Construction Council, Kennewick, WA 99336. 509-582-7424
  - h. Spokane Regional Plan Center, Spokane, WA 99202. 509-328-7279

**Port of Arlington** may reject any bid not in compliance with all prescribed public bidding procedures and requirements, and may reject for good cause any or all bids upon a finding of **Port of Arlington** it is in the public interest to do so. **Port of Arlington** also reserves the right to waive any informality in connection with said bid or to postpone the award of the Contract for sixty days.

Attention is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract. This public works project is

subject to the Oregon Prevailing Wage Rate laws. No bid will be received or considered by **Port of Arlington** unless the bid contains a statement by the Bidder as part of his bid that provisions of ORS 279C.800 thru ORS 276C.870 (Oregon Prevailing Wage Law) will be complied with and the Bidder is registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board as required by ORS 671.530.

Contractors are to note that there will be a mandatory Pre-bid meeting at the **Port of Arlington Office, 100 Island Park Way, Arlington, OR 97812, on Thursday, December 21, 2017, 11:00 am Pacific Prevailing Time.** Attendance at this meeting is mandatory for those contractors bidding as General Contractors.

No bid may be withdrawn after the time set for the bid opening nor before the award of the Contract, unless award is delayed for a period exceeding sixty days or as per the instructions to bidders.

**Port of Arlington**

**PUBLISHING DATES:**

*Daily Journal of Commerce* – December 13, & December 20, 2017

*The Times Journal* – December 14, & December 21, 2017

# SUGGESTED INSTRUCTIONS TO BIDDERS

## TABLE OF CONTENTS

	<b>Page</b>
Article 1 – Defined Terms.....	1
Article 2 – Copies of Bidding Documents.....	1
Article 3 – Qualifications of Bidders.....	1
Article 4 – Examination of Bidding Documents, Other Related Data, and Site.....	2
Article 5 – Pre-Bid Conference.....	5
Article 6 – Site and Other Areas.....	5
Article 7 – Interpretations and Addenda.....	6
Article 8 – Bid Security.....	7
Article 9 – Contract Times.....	7
Article 10 – Liquidated Damages.....	7
Article 11 – Substitute and “Or-Equal” Items.....	7
Article 12 – Subcontractors, Suppliers and Others.....	8
Article 13 – Preparation of Bid.....	8
Article 14 – Basis of Bid; Comparison of Bids.....	9
Article 15 – Submittal of Bid.....	10
Article 16 – Modification and Withdrawal of Bid.....	10
Article 17 – Opening of Bids.....	10
Article 18 – Bids to Remain Subject to Acceptance.....	10
Article 19 – Evaluation of Bids and Award of Contract.....	11
Article 20 – Signing of Agreement.....	12
Article 21 – Retainage.....	12
Article 22 – PREVAILING WAGE.....	12
Article 23 – Asbestos abatement.....	12

## **ARTICLE 1 – DEFINED TERMS**

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered. Pillar Consulting Group, Inc., PO Box 704, 135 S Main ST, Ste 206, Condon, OR 97823.

## **ARTICLE 2 – COPIES OF BIDDING DOCUMENTS**

- 2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the advertisement or invitation to bid may be obtained from the Issuing Office. Additional copies may be purchased from Salem Printing & Blueprint, Inc., 252 SW Jefferson Avenue, Corvallis, OR 97333 (541) 738-7023 at the requestor's expense. Contract documents may also be obtained electronically from the engineer: Pillar Consulting Group, Inc., 135 S Main Street, Suite 206, Condon, OR 97823. jeff@pillar-inc.com.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

## **ARTICLE 3 – QUALIFICATIONS OF BIDDERS**

- 3.01 To demonstrate Bidder's qualifications to perform the Work, within 5 days of Owner's request, Bidder shall submit written evidence such as financial data; previous experience, present commitments, and such other data as may be called for below.
- A. Bidder's state contractor license number
- B. Experience and reference from similar renovation project in public spaces with limited schedules. Two examples, with two references will be required.
- 3.02 *Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.*
- 3.03 Asbestos removal is not within the scope of this project and the contractor is not required to be licensed under ORS 468A.720 for asbestos abatement.

## **ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE**

### **4.01 *Bidding documents:***

- A. Bidding documents may be viewed at Port of Arlington Office, 100 Island Park Way, Arlington, OR 97812, 541 454 2868, to schedule an appointment.
- B. See advertisement for bid for other access to bidding documents.

### **4.02 *Subsurface and Physical Conditions***

- A. The Supplementary Conditions identify:
  - 1. Geotechnical Report prepared by Materials Testing & Inspection (Boise ID), December 11, 2017, included in Project Manual
- B. Copies of reports and drawings referenced but not included in the documents in Paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

### **4.03 *Underground Facilities***

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
  - 1. Site Survey Prepared by Anderson Perry & Associates, Inc. included in project manual
  - 2. Selected record drawings of Mesa Industrial Park prepared by Anderson Perry & Associates, Inc. included in project manual

### **4.04 *Hazardous Environmental Condition***

- A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.
  - 1. N/A
- B. Copies of reports and drawings referenced in Paragraph 4.04.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as



provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

- 4.05 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions.
- 4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06 A. Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.
- B. Paragraph 6.13.C of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.
- 4.07 It is the responsibility of each Bidder before submitting a Bid to:
- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data," and (2)

reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data";

- E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.09 This project is subject to the provisions of environmental and natural resources laws enacted by the Oregon Department of Environmental Quality and the Federal Environmental Protection Agency.

- A. If the project is awarded and is delayed or additional work is required by reason of existing ordinances, rules or regulations by agencies not cited in this document or the adoption of new ordinances or regulations or the amendments to existing ordinances or regulations relating to

environmental pollution and the preservation of natural resources occurring after the submission of the successful bid, the owner may do one or more of the following:

1. Terminate the contract
  2. Complete the work itself
  3. Use non-agency forces already under contract with the contracting agency
  4. Require that the underlying property owner be responsible for cleanup
  5. Solicit bids for a new contractor to provide the necessary services under the complete bid requirements of Oregon public contracting law
  6. Or issue the contractor a change order setting forth the additional work that must be undertaken.
- B. This project is not subject to the provisions of NPDES 1200C permits for erosion control as issued by the Oregon Department of Environmental Quality, but the contractor should not allow sediment to run off the site or the site to erode. In addition, this site may be subject to noise pollution regulations set for by the Oregon Department of Environmental Quality. The equipment used should meet the requirements of secondary containment and petroleum shall not be allowed to enter the ground per Oregon Department of Environmental Quality or Environmental Protection Agency regulation.

#### **ARTICLE 5 – PRE-BID CONFERENCE**

- 5.01 **A pre-bid conference will be held at 11:00 a.m. local time on December 21, 2017 at the Port of Arlington Office, 100 Island Park Way, Arlington, OR 97812.** Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective. This conference is mandatory for prospective bidders.

#### **ARTICLE 6 – SITE AND OTHER AREAS**

- 6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.
- A. Lay down and staging space is limited to the site area and will need to be coordinated with the owner

## ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.
- 7.03 *Addenda will be issued to each attendee of the pre-bid conference who indicates that they intend to bid on the project, and to each plan center where the bidding documents are posted. Addenda will be issued via e-mail.*

## **ARTICLE 8 – BID SECURITY**

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of (5) five percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 8.02 Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

## **ARTICLE 9 – CONTRACT TIMES**

- 9.01 The times for Substantial Completion and readiness for final payment are to be set forth by Bidder in the Bid and will be entered into the Agreement (or incorporated therein by reference to the specific language of the Bid). The times will be taken into consideration by Owner during the evaluation of Bids, and it will be necessary for the apparent Successful Bidder to satisfy Owner that it will be able to achieve Substantial Completion and be ready for final payment within the times designated in the Bid.

## **ARTICLE 10 – LIQUIDATED DAMAGES**

- 10.01 Provisions for liquidated damages are set forth in the Agreement.
- 10.02 *See section 00 11 00, summary of work for project phases, and completion time for each phase.*

## **ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS**

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or those substitute or “or-equal” materials and equipment approved by Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or “or-equal” item. No item of material or equipment will be considered by Engineer as a substitute or “or-equal” unless written request for approval has been submitted by Bidder and has been received by Engineer at least 10 days prior to the date for receipt of Bids. Each such request shall conform to the requirements of Paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

## **ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS**

12.01 Contractor will be required to disclose first-tier subcontractors within 2 hours of the bid via hand delivered, fax or other written media per ORS 279C.370. See section 15.04.

## **ARTICLE 13 – PREPARATION OF BID**

13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from the project manual.

13.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternative, adjustment unit price item, and unit price item listed therein. In the case of optional alternatives the words “No Bid,” “No Change,” or “Not Applicable” may be entered.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

13.06 A Bid by an individual shall show the Bidder’s name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.

13.08 All names shall be printed in ink below the signatures.

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.

13.10 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

13.11 The Bid shall contain evidence of Bidder’s authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder’s state contractor license number, if any, shall also be shown on the Bid Form.

- 13.12 Contractors are not required to be licensed under ORS 468A.720 for asbestos abatement. Asbestos abatement is not anticipated, and if required, will be provided under a separate contract.
- 13.13 Each bidder shall identify on the bid form the following information:
- A. Acknowledge that the provisions of ORS 279C.838 and/or 279C.840 will be complied with.
  - B. Identify whether the bidder is a resident bidder as defined in ORS 279A.120
  - C. Contractor's certification of nondiscrimination in obtaining required subcontractors in accordance with ORS 279A.110(4)

## **ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS**

### **14.01 *Lump Sum***

- A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate. In the comparison of Bids, alternates will be applied in the same order as listed in the Bid form.
  - 1. Bidders may submit a Bid for any of the separate sections or any combination of sections as provided in the Bid Form. Submission of a Bid on any section signifies Bidder's willingness to enter into a Contract for that section alone at the price offered.
  - 2. Bidders offering a Bid on one or more sections shall be capable of completing the Work within the time period stated in the Agreement.

### **14.02 *Unit Price***

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

## ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security.
- 15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” A mailed Bid shall be addressed to **Port of Arlington , c/Denis Ball, 100 Island Park Way, PO Box 279, Arlington, OR 97812**
- 15.03 A surety bond (bid bond), irrevocable letter of credit issued by an insured institution as defined ORS 706.008, cashier’s check or certified check, bid bond in the amount of 5% of the bid value shall be submitted with the bid. The contractor may use the attached bid bond form or other method as outlined above.
- 15.04 Bidders will be required to submit to the First Tier Subcontractor Disclosure within 2 hours of the bid closure deadline per ORS 279C.370. Disclosure is required for all first-tier subcontractors that will be providing labor or labor & materials in conjunction with the project, and have a contract value equal to or greater than 5% of the bid or \$15,000 (whichever is greater) and for all subcontractors that have a contract value of \$350,000 or more.
- A. The *First Tier Subcontractor Disclosure* may be delivered with the bid, or within 2 hours of the bid closing in person, by mail, or be faxed to 541-454-2053. The disclosure form should be made attention to **Denise Ball**, and reference the project name and any other information required on the form.

## ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

## ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

## ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.



18.02 A notice of *intent to award bid* will be issues 7 days prior to awarding the contract to the lowest responsible bidder.

## **ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT**

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 Owner reserves the right to reject any and all bids not issued in compliance with prescribed public contracting procedures and requirements and may reject for good cause all bids upon finding of the agency that it is in the public interest to do so.

19.03 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.04 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.05 In evaluating Bidders, Owner will evaluate bidders as responsible bidders per ORS 279C.375. Bid will be awarded to lowest responsible bidder or it will not be awarded.

19.06 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.

### A. The lowest apparent bidder

19.07 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is the lowest responsible bidder.

19.08 No bid will be received or considered by the owner, unless the big contains a statement that the provisions of ORS 279C.838 or 279C.840 will be complied with.

19.09 No bid will be received or considered unless the bidder is licensed by the Construction Contractors Board.

19.10 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the

Successful Bidder delivers the executed Agreement to Owner, *it shall be accompanied by such bonds & insurance certificates.*

19.11 *Bidder License Qualifications:*

- A. Licensed to business in the State of Oregon
- B. Licensed with the Oregon Contractors Construction Board for the type of work indicated.
- C. A license for asbestos removals per ORS 468A.720 is not required. Asbestos mitigation will be through another contract.

**ARTICLE 20 – SIGNING OF AGREEMENT**

20.01 Anticipated award schedule (subject to change):

- A. Bid opening: January 10, 2018
- B. Identification of lowest responsible bidder and notice of intent to award: January 23, 2018.
- C. Award of contract: February 1, 2018.
- D. Notice to proceed: February 15, 2018.

20.02 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 10 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

**ARTICLE 21 – RETAINAGE**

21.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Agreement per ORS 279C.550- ORS 279C.580.

**ARTICLE 22 – PREVAILING WAGE**

22.01 This project is subject to the provisions of Oregon Prevailing wage law ORS 279C.838 or 279C.840.

**ARTICLE 23 – ASBESTOS ABATEMENT**

23.01 This contract does not require that a contractor be a licensed asbestos abatement contractor per ORS 468A.720. Asbestos abatement, where required, will be provided under a separate contract executed by the owner with a licensed abatement contractor.

**SUGGESTED BID FORM  
FOR CONSTRUCTION CONTRACTS**

**BID FORM**

**POA Flex Building**

**TABLE OF CONTENTS**

	<b>Page</b>
Article 1 – Bid Recipient.....	1
Article 2 – Bidder’s Acknowledgements.....	1
Article 3 – Bidder’s Representations .....	1
Article 4 – Bidder’s Certification.....	2
Article 5 – Acknowledgements requireing Intials or other information.....	3
Article 6 – Basis of Bid .....	3
Article 7 – Time of Completion.....	5
Article 8 – Attachments to This Bid .....	5
Article 9 – Defined Terms.....	5
Article 10 – Bid Submittal.....	6

**ARTICLE 1 – BID RECIPIENT**

1.01 This Bid is submitted to:

*Port of Arlington  
Attn: Peter Mitchell  
PO Box 279  
100 Island Park Way  
Arlington, OR 97812*

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS**

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

**ARTICLE 3 – BIDDER’S REPRESENTATIONS**

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum No.                      Initial  
thru \_\_\_\_\_

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."

- E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- 1. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

#### **ARTICLE 4 – BIDDER'S CERTIFICATION**

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

**ARTICLE 5 – ACKNOWLEDGEMENTS REQUIREING INTIALS OR OTHER INFORMATION**

(intial blank spaces and/OR provide additional information as reqUested)

- 5.01 (Initial)\_\_\_\_\_The bidder will comply with the provisions of ORS 279C.838 or 279C.840
- 5.02 (Initial)\_\_\_\_\_The contractor is licensed in the State of Oregon to perform the work included in this bid. The bidders CCB # is (enter CCB #) \_\_\_\_\_
- 5.03 The bidder (check one) \_\_\_\_\_ is or \_\_\_\_\_ is not a resident bidder as described in ORS 279A.120
- 5.04 (Initial)\_\_\_\_\_The contractor is did not discriminate in obtaining required subcontractors in accordance with ORS 279A.110(4)

**ARTICLE 6 – BASIS OF BID**

- 6.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

<i>BID ITEMS</i>	\$ _____
<i>Base Bid (Lumps Sum)</i> <i>Written:</i> \$ _____	
<i>Alternate #1 (additive): Additional PCC paving in parking lot. Approximately 3,600 SF</i>	\$ _____
<i>Unit Item #1. Adjustment in building footing size. Base bid assumes 59.2 CY of concrete. Actual payment will be adjusted by Unit item 1 in \$/CY of actual concrete used in building footing types.</i>	\$ _____

All specified cash allowances are included in the price(s) set forth above, and have been computed in accordance with Paragraph 11.02 of the General Conditions.

**UNIT PRICE BASIS FOR ADJUSTMENT OF CONTRACT VALUE  
FROM BASE -BID**

Item No.	Description	Unit	Bid Unit Price
1	Footing concrete, reinforcement and associated work, in-place for adjustment of footing sizes from those shown on drawing To be used if total design footing concrete volume exceeds or is less than 59 CY. Does not include pedestal or turn-down volume.	CY	\$
2	Load, haul, and place gravel (crushed aggregate) as required for over excavation or for thickened rock section if requested by Owner	TY	\$
3	Load, haul, and place pit run or structural fill as required for over excavation or for thickened rock section if requested by Owner	TY	\$
4	Excavation & haul off-site existing soil in excess base bid	TY	\$

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

TY= Truck Yard (loose yard in truck)

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids adjustment of contract prices, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.



**ARTICLE 7 – TIME OF COMPLETION**

- 7.01 Bidder agrees that the Work will be substantially complete within 180 calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 210 calendar days after the date when the Contract Times commence to run.
- 7.02 Project is subject to individual substantial completion times as follows. Liquidated may be assessed at a rate of \$200 per working day for each day beyond that allowed for substantial completion, and \$100 per working day for each day beyond that allowed for final completion.

**ARTICLE 8 – ATTACHMENTS TO THIS BID**

- 8.01 The following documents are submitted with and made a condition of this Bid:
  - A. Required Bid security in the form of \_\_\_\_\_;
  - B. List of Proposed Subcontractors to be submitted within 2 hours of opening bid;

**ARTICLE 9 – DEFINED TERMS**

- 9.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

**ARTICLE 10 – BID SUBMITTAL**

9.01 This Bid is submitted by:

If Bidder is:

An Individual

Name (typed or printed): \_\_\_\_\_

By: \_\_\_\_\_  
(Individual's signature)

Doing business as: \_\_\_\_\_

A Partnership

Partnership Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

A Corporation

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_

By: \_\_\_\_\_  
(Signature -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_  
(CORPORATE SEAL)

Attest \_\_\_\_\_

Date of Qualification to do business in Oregon is \_\_\_\_ / \_\_\_\_ / \_\_\_\_.

A Joint Venture

Name of Joint Venture: \_\_\_\_\_

First Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

Second Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No. \_\_\_\_\_

E-mail \_\_\_\_\_

SUBMITTED on \_\_\_\_\_, 20\_\_\_\_.

State Contractor License No. \_\_\_\_\_.

**SECTION 00420- First Tier Subcontractor Disclosure**

PROJECT NAME: POA Flex Building

FORM SUBMISSION DEADLINE: Within 2 hours of bid opening

BIDDER: \_\_\_\_\_

BID CLOSING: Date: January 10, 2018      Time: 2:00 PM Pacific Prevailing Time

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time. If faxed, fax to 541-454-2053.

List below the name of each subcontractor that will be furnishing labor or labor and materials and that is required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED.)

#	Name	Dollar Value	Category of Work
1		\$	
2		\$	
3		\$	
4		\$	
5		\$	

Failure to submit this form by the disclosure deadline will result in a non-responsive bid. A nonresponsive bid will not be considered for award (bid will be rejected).

BIDDER NAME (submitted by): \_\_\_\_\_

CONTACT NAME: \_\_\_\_\_

PHONE NUMBER: \_\_\_\_\_

**BID BOND**

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

BIDDER *(Name and Address):*

SURETY *(Name and Address of Principal Place of Business):*

OWNER *(Name and Address):*

Port of Arlington  
PO Box 279  
Arlington, OR 97812

BID

Bid Due Date: January 10, 2108  
Description:  
POA Flex Building

BOND

Bond Number:  
Date (Not earlier than Bid due date):  
Penal sum \_\_\_\_\_

(Words)

\$

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

**BIDDER**

**SURETY**

(Seal)

(Seal)

\_\_\_\_\_  
Bidder's Name and Corporate Seal

\_\_\_\_\_  
Surety's Name and Corporate Seal

By:

\_\_\_\_\_  
Signature

By:

\_\_\_\_\_  
Signature (Attach Power of Attorney)

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

Attest:

\_\_\_\_\_  
Signature

Attest:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

*Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.*

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder who submitted a responsive Bid as determined by Owner for the work required by the Contract Documents, provided that:
  - 1.1 If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the penal sum set forth on the face of this Bond, and
  - 1.2 In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the face of this Bond.
  - 1.3 Recovery under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2 All Bids are rejected by Owner, or
  - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

# Notice of Award

Date: TBD

Project: POA Flex Building	
Owner: Port of Arlington	Owner's Contract No.:
Contract: Construction Contract	Engineer's Project No.: 2017-015
Bidder: TBD	
Bidder's Address: <i>TBD</i>	

You are notified that your Bid dated TBD, for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for POA Flex Building

The Contract Price of your Contract is TBD Dollars (\$TBD). (XX)

(6) Copies of the proposed Contract Documents (except Drawings) will follow this Notice of Award within 7 days.

(2) Sets of the Drawings will be delivered separately or otherwise made available to you within 8 days.

You must comply with the following conditions precedent within 14 days of the date you receive this Notice of Award or 7 days after receipt of contract documents.

1. Deliver to the Owner four fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:  
Insurance certificates as required in supplemental conditions with the following as additional

insured:

- Port of Arlington

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions , Owner will return to you one fully executed counterpart of the Contract Documents.

\_\_\_\_\_  
Port of Arlington  
Owner  
By: \_\_\_\_\_  
Authorized Signature  
\_\_\_\_\_  
Title

Copy to Engineer

**SUGGESTED FORM OF AGREEMENT  
BETWEEN OWNER AND CONTRACTOR  
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)**

THIS AGREEMENT is by and between \_\_\_\_\_ Port of Arlington \_\_\_\_\_ (“Owner”) and  
\_\_\_\_\_ TBD \_\_\_\_\_ (“Contractor”).

Owner and Contractor hereby agree as follows:

**ARTICLE 1 – WORK**

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

1. Construction of a new 6,000SF Flexible use building and associated site work

**ARTICLE 2 – THE PROJECT**

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows: **POA Flex Building**

**ARTICLE 3 – ENGINEER**

3.01 The Project has been designed by Pillar Consulting Group, Inc (Engineer), which is to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

**ARTICLE 4 – CONTRACT TIMES**

4.01 *Time of the Essence*

- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Substantial Completion and Final Payment*

- A. The Work will be substantially completed within 180 days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 210 days after the date when the Contract Times commence to run.



#### 4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$200.00 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$100.00 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

### **ARTICLE 5 – CONTRACT PRICE**

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A, 5.01.B, and 5.01.C below:

A. For all Work other than Unit Price Work, a lump sum of: \$TBD

B. Unit Price work:

1. Adjustment to contract price for footing concrete volumes different than the base bid of 59 CY.
2. Supply place and install gravel fill in excess of base bid: \$ /TY
3. Supply place and install pit run or structural fill in excess of base bid: \$/TY
4. Excavation & haul off-site existing soil in excess base bid

All specific cash allowances are included in the above price in accordance with Paragraph 11.02 of the General Conditions.

### **ARTICLE 6 – PAYMENT PROCEDURES**

#### 6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

## 6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 30 day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.
- a. 95 percent of Work completed (with the balance being retainage). 95 percent of cost of materials and equipment delivered and stored on-site not incorporated in the Work (with the balance being retainage).
- b. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed (the balance being retainage).
- B. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

## **ARTICLE 7 – INTEREST**

- 7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 18 percent per annum.

## **ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS**

- 8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
- B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."
- E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

## **ARTICLE 9 – CONTRACT DOCUMENTS**

### *9.01 Contents*

- A. The Contract Documents consist of the following:
  - 1. This Agreement (pages 1 to 8, inclusive).
  - 2. Performance bond.
  - 3. Payment bond.
  - 4. General Conditions (pages 1 to 63, inclusive).

5. Supplementary Conditions (pages 1 to 7, inclusive).
  6. Specifications as listed in the table of contents of the Project Manual.
  7. Drawings consisting of 70 sheets with each sheet bearing the following general title: Emergency Services Building.
  8. Addenda (numbers 1 to 6, inclusive).
  9. Exhibits to this Agreement (enumerated as follows):
    - a. Contractor's Bid (pages 1 to 6, inclusive).
    - b. Notice to Proceed (pages 1 to 1, inclusive).
    - c. Notice of Award (pages 1 to 1, inclusive)
    - d. ~~Documentation submitted by Contractor prior to Notice of Award (pages \_\_\_\_\_ to \_\_\_\_\_, inclusive).~~
    - e. ~~[List other required attachments (if any), such as documents required by funding or lending agencies].~~
  10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
    - a. Work Change Directives.
    - b. Change Orders.
    - c. Insurance certificates
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

## ARTICLE 10 – MISCELLANEOUS

### 10.01 Terms

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

#### 10.02 *Assignment of Contract*

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

#### 10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

#### 10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

#### 10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
  - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

- B. Contractor certifies that all subcontractors performing Work described in ORS 701.005(2) (i.e., construction Work) will be registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board in accordance with ORS 701.035 to 701.055 before the subcontractors commence Work under the Contract.

#### 10.06 *Other Provisions*

##### A. Statutory Requirements

###### 1. Contractor shall:

- a. Make payment promptly, as due, to all persons supplying to the contractor labor or material for the performance of the work provided for in the contract. (ORS 279C.505(1))
- b. Demonstrate that an employee drug testing program is in place. (ORS 279C.505(2))
- c. To the greatest extent possible salvage or recycle construction and demolition debris if feasible and cost effective. (ORS 279C.510(1)).
- d. Pay all contributions or amounts due the Industrial Accident Fund from the contractor or subcontractor incurred in the performance of the contract.
- e. Not permit any lien or claim to be filed or prosecuted against the state or a Gilliam County, or subdivision thereof, on account of any labor or material furnished
- f. Comply with prevailing wage requirements per ORS 279C.838 & 279C.840 and other sections as may be required.
- g. Comply with Oregon tax laws in accordance with ORS 305.385.
- h. Ensure that all subcontractors performing Work described in ORS 701.005(2) (i.e., construction Work) will be registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board in accordance with ORS 701.035 to 701.055 before the subcontractors commence Work under the Contract
- i. Those listed in Supplemental Conditions.

###### B. Coordinate with owner power outage to the owner

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on TBD (which is the Effective Date of the Agreement).

OWNER:

Port of Arlington

By: \_\_\_\_\_

Title: - Chairman

Address for giving notices:

100 Island Park Way

PO Box 279

Arlington, OR 97812

CONTRACTOR

-

By: \_\_\_\_\_

Title: \_\_\_\_\_

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Address for giving notices:

-

-

\_\_\_\_\_

CCB No.: \_\_\_\_\_

# Notice to Proceed

Date: TBD

---

Project: POA Flex Building	
Owner: Port of Arlington	Engineer: Pillar Consulting Group, Inc.
Contract: Construction Contract	Contract#: N/A
Contractor: TBD	
Contractor Address: <i>TBD</i>	

---

You are notified that the Contract Times under the above Contract will commence to run on TBD On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is 180 days, and the date of readiness for final payment is 210 days (30 days after substantial completion)

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insured's and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

Coordinate w/owner; Obtain a 1200C Erosion and Sediment Control Permit

_____	Owner: Port of Arlington
_____	Given by:
_____	Authorized Signature
_____	Title:
_____	Date:

Copy to Engineer



## CONTRACTOR'S COMPLETION CERTIFICATION

\_\_\_\_\_ hereby certifies that the contract known as  
(CONTRACTOR)

**POA Flex Building** has been completed in accordance with all requirements of the project Contract Documents. The Contractor further certifies that information contained in the Record Drawings and Operation and Maintenance Manual is complete, accurate, and properly described equipment, materials, and system installed as a part of the Work. The Contractor further certifies that proper training has been given to the OWNER's designated representative as to proper operation and service of the project system and components.

By: \_\_\_\_\_  
(Authorized Signature)  
\_\_\_\_\_  
(Name)  
\_\_\_\_\_  
(Title)  
\_\_\_\_\_  
(Date)

-----  
(All items below the dotted line shall be completed by the PROJECT MANAGER)

Review by PROJECT MANAGER:

Construction work appears to be complete and a final inspection is scheduled for  
\_\_\_\_\_.  
(Date and Time)

Construction work is not complete. The Contractor shall complete the necessary work and resubmit a new "Contractor's Completion Certification".

**Pillar Consulting Group, Inc.**

By: \_\_\_\_\_  
(Authorized Signature)  
Jeff Schott, P.E.  
\_\_\_\_\_  
(Name)  
Project Manager  
\_\_\_\_\_  
(Title)  
\_\_\_\_\_  
(Date)

**Instructions:** This form shall be completed by the Contractor when the Work is complete, i.e., construction, paperwork, etc. It must be completed along with the request for final Application for Payment and release of retainage.

- 5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
- 5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
- 5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

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

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

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

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

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

11. Definitions.

- 11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
- 11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – *(Name, Address and Telephone)*  
Surety Agency or Broker:  
Owner's Representative *(Engineer or other party)*:

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

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

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

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms “labor, materials or equipment” that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – *(Name, Address, and Telephone)*

Surety Agency or Broker:

Owner’s Representative *(Engineer or other)*:

## Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner): <p style="text-align: center;">Port of Arlington</p>	From (Contractor): <p style="text-align: center;"><b>TBD</b></p>	Via (Engineer): <p style="text-align: center;">Pillar Consulting Group, Inc.</p>
Project: <p style="text-align: center;"><b>POA Flex Building</b></p>	Contract: Construction Contract	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.: <p style="text-align: center;">2014-000</p>

### Application For Payment Change Order Summary

Approved Change Orders			
Number	Additions	Deductions	
	C		<b>1. ORIGINAL CONTRACT PRICE</b> ..... \$ _____
			<b>2. Net change by Change Orders</b> ..... \$ _____
			<b>3. Current Contract Price (Line 1 ± 2)</b> ..... \$ <b>#VALUE!</b>
			<b>4. TOTAL COMPLETED AND STORED TO DATE</b> (Column F on Progress Estimate)..... \$ _____
			<b>5. RETAINAGE:</b>
			a.     X     _____ <b>Work Completed</b> ..... \$ _____
			b.     X     _____ <b>Stored Material</b> ..... \$ _____
			c. <b>Total Retainage (Line 5a + Line 5b)</b> ..... \$ _____
			<b>6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)</b> ..... \$ _____
			<b>7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)</b> ..... \$ _____
			<b>8. AMOUNT DUE THIS APPLICATION</b> ..... \$ _____
			<b>9. BALANCE TO FINISH, PLUS RETAINAGE</b> (Column G on Progress Estimate + Line 5 above)..... \$ _____
TOTALS			
NET CHANGE BY CHANGE ORDERS			

<b>Contractor's Certification</b>	
<p>The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.</p>	
By:	Date:

Payment of: \$ \_\_\_\_\_  
(Line 8 or other - attach explanation of the other amount)

is recommended by: \_\_\_\_\_ (Date) \_\_\_\_\_ (Engineer)

Payment of: \$ \_\_\_\_\_  
(Line 8 or other - attach explanation of the other amount)

is approved by: \_\_\_\_\_ (Date) \_\_\_\_\_ (Owner)

Approved by: \_\_\_\_\_ (Date) \_\_\_\_\_ (Funding Agency (if applicable))

Endorsed by the Construction Specifications Institute.

# Progress Estimate

# Contractor's Application

For (contract):				Application Number:				
Application Period:				Application Date:				
A		B	Work Completed		E	F		G
Item		Scheduled Value	C	D	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (E) B	Balance to Finish (B - F)
Specification Section No.	Description		From Previous Application (C+D)	This Period				
<b>Totals</b>								

**Progress Estimate**

**Contractor's Application**

For (contract):							Application Number:			
Application Period:							Application Date:			
A				B	C	D	E	F		
Item		Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F) B	Balance to Finish (B - F)
Bid Item No.	Description									
<b>Totals</b>										

# Stored Material Summary

# Contractor's Application

For (contract):							Application Number:		
Application Period:							Application Date:		
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage (\$) (D + E - F)
			Date (Month/Year)	Amount (\$)	Amount (\$)	Subtotal	Date (Month/Year)	Amount (\$)	
<b>Totals</b>									

# Certificate of Substantial Completion

Project: POA Flex Building

Owner: Port of Arlington

Owner's Contract No.:N/A

Contract: Construction Contract

Engineer's Project No.:2017-015

**This definitive Certificate of Substantial Completion applies to:**

- All Work under the Contract Documents:       The following specified portions of the Work:

---

---

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---

-  
\_\_\_\_\_  
Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:**

- Amended Responsibilities                       Not Amended

Owner's Amended Responsibilities:

---

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Contractor's Amended Responsibilities:

-

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-

---



The following documents are attached to and made part of this Certificate:

---

---

---

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

---

Executed by Engineer \_\_\_\_\_ Date \_\_\_\_\_

---

Accepted by Contractor \_\_\_\_\_ Date \_\_\_\_\_

---

Accepted by Owner \_\_\_\_\_ Date \_\_\_\_\_

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



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*A Practice Division of the*  
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

## TABLE OF CONTENTS

	<b>Page</b>
Article 1 – Definitions and Terminology .....	1
1.01 Defined Terms.....	1
1.02 Terminology.....	5
Article 2 – Preliminary Matters .....	6
2.01 Delivery of Bonds and Evidence of Insurance.....	6
2.02 Copies of Documents.....	6
2.03 Commencement of Contract Times; Notice to Proceed.....	6
2.04 Starting the Work.....	7
2.05 Before Starting Construction .....	7
2.06 Preconstruction Conference; Designation of Authorized Representatives .....	7
2.07 Initial Acceptance of Schedules.....	7
Article 3 – Contract Documents: Intent, Amending, Reuse .....	8
3.01 Intent.....	8
3.02 Reference Standards.....	8
3.03 Reporting and Resolving Discrepancies.....	9
3.04 Amending and Supplementing Contract Documents.....	9
3.05 Reuse of Documents .....	10
3.06 Electronic Data.....	10
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points.....	11
4.01 Availability of Lands .....	11
4.02 Subsurface and Physical Conditions .....	11
4.03 Differing Subsurface or Physical Conditions.....	12
4.04 Underground Facilities .....	13
4.05 Reference Points .....	14
4.06 Hazardous Environmental Condition at Site.....	14
Article 5 – Bonds and Insurance .....	16
5.01 Performance, Payment, and Other Bonds .....	16
5.02 Licensed Sureties and Insurers .....	16
5.03 Certificates of Insurance .....	17
5.04 Contractor’s Insurance.....	17
5.05 Owner’s Liability Insurance .....	19
5.06 Property Insurance .....	19
5.07 Waiver of Rights .....	20
5.08 Receipt and Application of Insurance Proceeds.....	21

5.09	Acceptance of Bonds and Insurance; Option to Replace.....	21
5.10	Partial Utilization, Acknowledgment of Property Insurer .....	22
Article 6 – Contractor’s Responsibilities .....		22
6.01	Supervision and Superintendence.....	22
6.02	Labor; Working Hours.....	22
6.03	Services, Materials, and Equipment .....	23
6.04	Progress Schedule .....	23
6.05	Substitutes and “Or-Equals” .....	23
6.06	Concerning Subcontractors, Suppliers, and Others.....	26
6.07	Patent Fees and Royalties .....	27
6.08	Permits.....	28
6.09	Laws and Regulations .....	28
6.10	Taxes .....	28
6.11	Use of Site and Other Areas .....	28
6.12	Record Documents.....	29
6.13	Safety and Protection .....	29
6.14	Safety Representative.....	30
6.15	Hazard Communication Programs .....	31
6.16	Emergencies .....	31
6.17	Shop Drawings and Samples .....	31
6.18	Continuing the Work.....	33
6.19	Contractor’s General Warranty and Guarantee.....	33
6.20	Indemnification .....	34
6.21	Delegation of Professional Design Services .....	34
Article 7 – Other Work at the Site.....		35
7.01	Related Work at Site .....	35
7.02	Coordination.....	36
7.03	Legal Relationships.....	36
Article 8 – Owner’s Responsibilities.....		36
8.01	Communications to Contractor.....	36
8.02	Replacement of Engineer.....	36
8.03	Furnish Data .....	37
8.04	Pay When Due .....	37
8.05	Lands and Easements; Reports and Tests.....	37
8.06	Insurance .....	37
8.07	Change Orders.....	37
8.08	Inspections, Tests, and Approvals .....	37
8.09	Limitations on Owner’s Responsibilities .....	37
8.10	Undisclosed Hazardous Environmental Condition .....	37
8.11	Evidence of Financial Arrangements .....	37
8.12	Compliance with Safety Program.....	38
Article 9 – Engineer’s Status During Construction .....		38
9.01	Owner’s Representative.....	38
9.02	Visits to Site .....	38

9.03	Project Representative .....	38
9.04	Authorized Variations in Work .....	39
9.05	Rejecting Defective Work .....	39
9.06	Shop Drawings, Change Orders and Payments.....	39
9.07	Determinations for Unit Price Work .....	39
9.08	Decisions on Requirements of Contract Documents and Acceptability of Work.....	39
9.09	Limitations on Engineer’s Authority and Responsibilities.....	40
9.10	Compliance with Safety Program.....	41
Article 10 – Changes in the Work; Claims .....		41
10.01	Authorized Changes in the Work .....	41
10.02	Unauthorized Changes in the Work .....	41
10.03	Execution of Change Orders.....	41
10.04	Notification to Surety.....	42
10.05	Claims.....	42
Article 11 – Cost of the Work; Allowances; Unit Price Work.....		43
11.01	Cost of the Work .....	43
11.02	Allowances .....	45
11.03	Unit Price Work .....	46
Article 12 – Change of Contract Price; Change of Contract Times .....		46
12.01	Change of Contract Price.....	46
12.02	Change of Contract Times .....	48
12.03	Delays.....	48
Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work .....		49
13.01	Notice of Defects .....	49
13.02	Access to Work .....	49
13.03	Tests and Inspections .....	49
13.04	Uncovering Work.....	50
13.05	Owner May Stop the Work.....	50
13.06	Correction or Removal of Defective Work .....	50
13.07	Correction Period.....	51
13.08	Acceptance of Defective Work.....	52
13.09	Owner May Correct Defective Work .....	52
Article 14 – Payments to Contractor and Completion.....		53
14.01	Schedule of Values.....	53
14.02	Progress Payments .....	53
14.03	Contractor’s Warranty of Title .....	56
14.04	Substantial Completion.....	56
14.05	Partial Utilization .....	57
14.06	Final Inspection.....	57
14.07	Final Payment.....	57
14.08	Final Completion Delayed.....	58
14.09	Waiver of Claims .....	59

Article 15 – Suspension of Work and Termination .....	59
15.01 Owner May Suspend Work .....	59
15.02 Owner May Terminate for Cause .....	59
15.03 Owner May Terminate For Convenience.....	60
15.04 Contractor May Stop Work or Terminate .....	61
Article 16 – Dispute Resolution .....	61
16.01 Methods and Procedures.....	61
Article 17 – Miscellaneous .....	62
17.01 Giving Notice .....	62
17.02 Computation of Times .....	62
17.03 Cumulative Remedies .....	62
17.04 Survival of Obligations .....	63
17.05 Controlling Law .....	63
17.06 Headings.....	63

## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
  7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
  9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.



12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and

furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 *Terminology*

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

### B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

### C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

### D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
  - a. does not conform to the Contract Documents; or
  - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

- c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

## ARTICLE 2 – PRELIMINARY MATTERS

### 2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

### 2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### 2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A

Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

#### 2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

#### 2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
  - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
  - 2. a preliminary Schedule of Submittals; and
  - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

#### 2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

#### 2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete

and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

### **ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

#### **3.01 *Intent***

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

#### **3.02 *Reference Standards***

- A. Standards, Specifications, Codes, Laws, and Regulations
  1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the

performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

#### B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
  - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
  - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

### 3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.



- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
1. A Field Order;
  2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
  3. Engineer's written interpretation or clarification.

### 3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
  2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

### 3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

## ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

### 4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

### 4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
  - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
  - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
  - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
  - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

#### 4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:
1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
  2. is of such a nature as to require a change in the Contract Documents; or
  3. differs materially from that shown or indicated in the Contract Documents; or
  4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
  - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
  - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and

contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

- c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
  - a. reviewing and checking all such information and data;
  - b. locating all Underground Facilities shown or indicated in the Contract Documents;
  - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
  - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the

consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

#### 4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## **ARTICLE 5 – BONDS AND INSURANCE**

### **5.01 *Performance, Payment, and Other Bonds***

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### **5.02 *Licensed Sureties and Insurers***

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also

meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

### 5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

### 5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:



- a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
  - b. by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
  2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
  3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
  4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
  5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
  6. include completed operations coverage:
    - a. Such insurance shall remain in effect for two years after final payment.
    - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

## 5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

## 5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
  2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
  3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
  4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
  5. allow for partial utilization of the Work by Owner;
  6. include testing and startup; and
  7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

#### 5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other

party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

**ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES**

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

### 6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

### 6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
  - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
  - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

### 6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
  - 1. "*Or-Equal*" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a

proposed item of material or equipment will be considered functionally equal to an item so named if:

- a. in the exercise of reasonable judgment Engineer determines that:
  - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
  - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
  - 3) it has a proven record of performance and availability of responsive service.
- b. Contractor certifies that, if approved and incorporated into the Work:
  - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
  - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
  - 1) shall certify that the proposed substitute item will:
    - a) perform adequately the functions and achieve the results called for by the general design,
    - b) be similar in substance to that specified, and
    - c) be suited to the same use as that specified;
  - 2) will state:

- a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
  - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
  - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
- 3) will identify:
- a) all variations of the proposed substitute item from that specified, and
  - b) available engineering, sales, maintenance, repair, and replacement services; and
- 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.



- F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
  2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

#### 6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

## 6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

## 6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

## 6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

## 6.11 *Use of Site and Other Areas*

### A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
  3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

#### 6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

#### 6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
  2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### 6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

## 6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

## 6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

## 6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

### 1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

### 2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

*C. Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:
  - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
  - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
  - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

*D. Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each

such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  1. observations by Engineer;
  2. recommendation by Engineer or payment by Owner of any progress or final payment;
  3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
  4. use or occupancy of the Work or any part thereof by Owner;
  5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;



6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

#### 6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
  1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

#### 6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents,

Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **ARTICLE 7 – OTHER WORK AT THE SITE**

### **7.01 *Related Work at Site***

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
  - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
  - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and

other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

#### 7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
  - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
  - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

#### 7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

### **ARTICLE 8 – OWNER'S RESPONSIBILITIES**

#### 8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

#### 8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

## 8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

## **ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION**

### 9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

### 9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

### 9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

#### 9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

#### 9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

#### 9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

#### 9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

#### 9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability

of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

## 9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

## **ARTICLE 10 – CHANGES IN THE WORK; CLAIMS**

### 10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

### 10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

### 10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
  - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.



#### 10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

#### 10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  - 1. deny the Claim in whole or in part;
  - 2. approve the Claim; or
  - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor

invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

## **ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### *11.01 Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
  - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
  - g. The cost of utilities, fuel, and sanitary facilities at the Site.
  - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

## 11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:
  - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
  2. there is no corresponding adjustment with respect to any other item of Work; and
  3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

## **ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the

Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
  - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
  - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
  - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
  - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
  - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

## 12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

## 12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

## **ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

### *13.01 Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

### *13.02 Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

### *13.03 Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
  - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
  - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.



- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

#### 13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims,

costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

### 13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  - 1. repair such defective land or areas; or
  - 2. correct such defective Work; or
  - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

#### 13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

#### 13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as

provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## **ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION**

### *14.01 Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

### *14.02 Progress Payments*

#### *A. Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

#### *B. Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
  - a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
  - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
  - a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
  - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in

Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

*D. Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - c. there are other items entitling Owner to a set-off against the amount recommended; or
  - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

#### 14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

#### 14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

#### 14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
  2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
  3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
  4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.



2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and
  - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

*B. Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

*C. Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment

(for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

#### 14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

### **ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

#### 15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

#### 15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
    1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
    2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
    3. complete the Work as Owner may deem expedient.
  - C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
  - D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
  - E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
  - F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

### 15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
  4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

## **ARTICLE 16 – DISPUTE RESOLUTION**

### 16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
  - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
  - 2. agrees with the other party to submit the Claim to another dispute resolution process; or
  - 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

## ARTICLE 17 – MISCELLANEOUS

### 17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
  - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

### 17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

### 17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

## Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC C-700 (2007 Edition). All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following in its place:

- A. **Owner shall furnish to Contractor up to 2 printed or hard copies of the Drawings and Project Manual and one set in electronic format. Additional copies will be furnished upon request at the cost of reproduction.**

SC-4.03 A.1:

1. Geotechnical Report prepared by MTI 12/11/2017
2. Site Survey drawing prepared by Anderson Perry & Associates, Inc.
3. Arlington Mesa Industrial Park Record Drawings, prepared by Anderson Perry & Associates, Inc.

SC-4.03 A.1:

1. N/A

SC-5.01D Add the following after SC-5.01C:

**D: Provide proof of statutory CCB bond in the amount of \$20000**

**E: All contractors and subcontractors unless otherwise exempt, to provide \$30,000 Statutory Public Works Bond per ORS Chapter 29C and as amended by Oregon Laws 2005, Chapter 360,**

SC-5.04 Add the following new paragraph immediately after Paragraph 5.04.B:

**C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:**

**1. Workers' Compensation, and related coverage's under Paragraphs 5.04.A.1 and A.2 of the General Conditions:**

- a. State: Statutory
- b. Applicable Federal (e.g., Longshoreman's): Statutory
- c. Employer's Liability: \$500,000

**2. Contractor's General Liability under Paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:**

- a. General Aggregate \$1,412,000
- b. Products - Completed Operations Aggregate \$1,412,000
- c. Personal and Advertising Injury \$1,412,000
- d. Each Occurrence (Bodily Injury and Property Damage) \$1,412,000
- e. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverages where applicable. \$706,000
- f. Excess or Umbrella Liability
  - General Aggregate \$N/R
  - Each Occurrence \$N/R

**3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:**

- a. Bodily Injury:
  - Each person \$1,412,000
  - Each Accident \$1,412,000
- b. Property Damage:
  - Each Accident \$1,412,000



[or]

- a. Combined Single Limit of \$1,412,000
- 4. The Contractual Liability coverage required by Paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:
  - a. Bodily Injury:
    - Each person \$1,412,000
    - Each Accident \$1,412,000
  - b. Property Damage:
    - Each Accident \$1,412,000
    - Annual Aggregate \$1,412,000

Additional Insured:

Port of Arlington

SC 5.06 A Remove section 5.06 A in its entirety and replace with:

- A. **Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:**

SC 5.11 Add new paragraph(s) immediately after Paragraph 5.10.A

#### **5.11 Medical Services and Workmen's Compensation Insurance Coverage**

**A. Contractor shall promptly, as due, make payment to any person, copartnership, association or corporation furnishing medical, surgical and hospital care services or other needed care and attention, incident to sickness or injury, to the employees of the contractor, of all sums that the contractor agrees to pay for the services and all moneys and sums that the contractor collected or deducted for the wage of employees under any law, contract or agreement for the purpose of providing or paying for the services.**

**B. All employers, including Contractor, that employ subject workers who work under this Contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. Contractor shall ensure that each of its subcontractors complies with these requirements.**

SC-6.02 Add new paragraphs immediately after Paragraph 6.02.B

**C. Contractor shall not employ any person for more than 10 hours in one day or 40 hours in any one week except in cases of necessity, emergency, or when the public policy absolutely requires it, and in such cases the employee shall be paid at least time and a half pay:**

**a. For all overtime in excess of eight hours in any one day or 40 hours in any one week when the work week is five consecutive days, Monday through Friday; or**

**b. For all overtime in excess of 10 hours in any one day or 40 hours in any one week when the work week is four consecutive days, Monday through Friday; and**

**c. For all work performed on Saturday and on any legal holiday specified in ORS 279C.540.**

**D. An employer must give notice in writing to employees who work on a public contract, either at the time of hire or before commencement of work on the contract, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week that the employees may be required to work.**

**E. When labor is employed by the state or a county, school district, municipality, municipal corporation or subdivision thereof through another as a contractor, any worker employed by the contractor shall be foreclosed from the right to collect for any overtime provided in ORS [279C.540 \(Maximum hours of labor on public contracts\)](#) unless a claim for payment is filed with the contractor within 90 days from the completion of the contract, providing the contractor has:**

**a. Caused a circular clearly printed in boldfaced 12-point type and containing a copy of this section to be posted in a prominent place alongside the door of the timekeepers office or in a similar place that is readily available and freely visible to workers employed on the work.**

**b. Maintained the circular continuously posted from the inception to the completion of the contract on which workers are or have been employed. [2003 c.794 §145]**

SC-6.06 Add a new paragraph(s) immediately after Paragraph 6.06.G:

**H. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.**

**I. Per ORS 279C.505 the contractor shall:**

- 1. Make payment promptly, as due, to all persons supplying to the contractor labor or material for the performance of the work provided for in the contract.**
- 2. Pay all contribution or amounts due the Industrial Accident Fund from the contractor or subcontractor incurred in the performance of the contract.**
- 3. No permit any lien or claim to be filed or prosecuted against the state or a county or subdivision thereof on account of any lobar or material furnished.**
- 4. Pay to the department of revenue all sums withheld from employees under ORS 316.167**
- 5. Contactor shall demonstrate that an employee drug testing program is in place.**

SC 6.08 Delete Paragraphs 6.08.A and in its entirety and insert the following:

**A. Owner shall pay for building permits plan review fees. The Contractor shall obtain the permit at the expense of the Contractor. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.**

SC 6.11.B Add the following sub-paragraphs:

- 1. All construction material is to be recycled or salvaged if feasible and cost-effective per ORS 279C.510.**
- 2. All yard waste or debris shall be composted or mulched at an approved site if feasible and cost effective per ORS 279C.510.**

SC 6.12 Add the following paragraph immediately after 6.12.A

**B. Contractor to provide owner with (3) approved hard-copies, and an electronic copy of operation and maintenance manuals for the equipment per the specifications.**

SC 6.17.E Add the following new paragraphs immediately after Paragraph 6.17.E:

**F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.**

**G. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.**

SC -6.19 D. Add the following new paragraph after 6.19.C

**D. The warranty period for all work, including coverage by the warranty bond, shall extend for a period of one year after substantial completion for materials, labor, equipment, consumables and sundry expenses.. Warranty for equipment shall be for a period of at least one year or the manufacture's standard warranty, or as set forth in the specification, whichever is longer.**

**1. Contractor will provide owner with copies of manufacturer's warranty.**

**2. The manufacturer's warranty shall not relieve the contractor of the responsibility to ensure response to warranty claims for the period of the warranty.**

SC6.20: Remove reference to Engineer in sections 6.20 A, B & C.

SC 6.22 : Add the following new paragraphs after 6.21.E

**6.22 Start-up, Operator Training, and first year maintenance**

**A. Contractor to provide start-up service on all equipment as recommended by the manufacturer, and set for the specifications.**

**B. Contractor to provide up to 4 hours of operator training or as recommended by the manufacturer, or set forth in the specification, whichever is greater.**

**SC6.23 Prevailing Wage requirements**

**A. The project is subject to the provisions of Oregon Prevailing wage rate per ORS 279C.800 to 279C.870. This project is to be subject to the prevailing wage rate as published by BOLI for July 2017. The contractor shall abide by these rules and wage rates.**

**1. Contractor shall comply with ORS 279C.840. This addresses wages, benefits, and posting of wage rates.**

**C. All contractors, subcontractors, or others subject to the provisions of prevailing wages shall have a public works bond on file with Construction Contractor's Board before starting work on the project, unless exempted per ORS 279C.836(4), (7), (8) or (9).**

**D. All subcontracts between the contractor and subcontractor shall have a provision requiring the subcontractor to have a public works bond filed with Construction Contractors Board before starting work unless exempt under ORS 279C.836 (4), (7), (8) or (9).**

**E. The contractor shall provide certified payroll documents to the owner per ORS 279C.845 by the fifth business day of each month.**

**SC6.25 Contractor relationship with subcontractors**

**A. Contractor to include in each subcontract for property or services the contractor enters into with a first-tier subcontractor, including a material supplier, for the purpose of performing a construction contract:**

**1. A payment clause that obligates the contractor to pay the first-tier subcontractor for satisfactory performance under the subcontract within 10 days out of amounts the contracting agency pays to the contractor under the public improvement contract.**

**2. A clause that requires the contractor to provide a first-tier subcontractor with a standard form that the first-tier subcontractor may use as an application for payment or as another method by which the subcontractor may claim a payment due from the contractor.**

**3. A clause that requires the contractor, except as otherwise provided in this paragraph, to use the same form and regular administrative procedures for processing payments during the entire term of the subcontract. A contractor may change the form or the regular administrative procedures the contractor uses for processing payments if the contractor:**

**a. Notifies the subcontractor in writing at least 45 days before the date on which the contractor makes the change; and**

**b. Includes with the written notice a copy of the new or changed form or a description of the new or changed procedure.**

**4. An interest penalty clause that obligates the contractor, if the contractor does not pay the first-tier subcontractor within 30 days after receiving payment from the contracting agency, to pay the first-tier subcontractor an interest penalty on amounts due in each payment the contractor does not make in accordance with the payment clause included in the subcontract under paragraph (a) of this subsection. A**

**contractor or first-tier subcontractor is not obligated to pay an interest penalty if the only reason that the contractor or first-tier subcontractor did not make payment when payment was due is that the contractor or first-tier subcontractor did not receive payment from the contracting agency or contractor when payment was due. The interest penalty:**

- a. Applies to the period that begins on the day after the required payment date and that ends on the date on which the amount due is paid; and**
- b. Is computed at the rate specified in ORS 279C.515(Conditions concerning payment of claims by public officers, payment to persons furnishing labor or materials and complaints) (2).**

SC 7.02.C. Add the following new paragraphs immediately after Paragraph 7.02.B

**C. Asbestos abatement is outside the scope of this contract, and if needed, will be provided through a separate contract by the owner with a licensed asbestos abatement firm. Contractor shall notify the owner when such services are required and are to coordinate and cooperate with the abatement firm to execute the required work.**

SC 14.02.D.4 & SC 14.02.D, Add the following new paragraph(s) after 14.02.D.3

**4. Per ORS 279C.845(7), contractor is obligated to submit certified payrolls with payment applications. Progress payments for applications without attached certified payrolls will be subject to retention of 25% the approved amount due pending receipt of the certified payrolls. Upon receipt of the certified payroll the approve amount will become due within 14 days regardless of whether a subcontractor has failed to file certified payrolls**

**5. Per ORS 279C.845(8) , the contractor shall retain 25 % of any amount earned by a first tier subcontractor until the contractor has filed with the owner certified payrolls. The Contractor shall verify that the first-tier subcontractor has filed the certified statements before the contractor may pay the subcontractor any amount retained under this subsection. The contractor shall pay the first-tier subcontractor the amount retained under this subsection with 14 days after the subcontractor files certified payroll documents.**

**SC 14.02.E. Public Work Payment provisions**

**1. If the contractor fails, neglects or refused to make prompt payment of any claim for labor or service furnished to the contractor or a subcontractor by any person in connection with the public improvement contract as the claim becomes due, the owner may pay such claim to the person furnishing the labor or services and charge**

the amount of the payment against funds due or to become due the contractor by reason of the contract.

2. If the contractor or a first-tier subcontractor fails, neglects or refuse to make payment to a person furnishing labor or materials in connection with public improvement contract within 30 days after receipt of payment from the contracting agency or a contractor, the contractor or first-tier subcontractor shall owe the person the amount due plus interest charges commencing at the end of the 10-day period that payment is due under ORS 279C.580 (4) and ending upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest charged to the contractor or first-tier subcontractor on the amount due shall equal three times the discount rate on 90-day commercial paper in effect at the Federal Reserve Bank in the Federal Reserve district that includes Oregon on the date that is 30 days after the date when payment was received from the contracting agency or from the contractor, but the rate of interest may not exceed 30 percent. The amount of interest may not be waived

3. If the contractor or a subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with the contract, the person may file a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580.

4. The payment of a claim in the manner authorized in this section does not relieve the contractor or the contractor's surety from obligation with respect to any unpaid claims.

5. Retainage of 5% will be withheld on all progress payments and released upon final approval.

SC 16.01. Replace section 16.01.A with the following language:

**A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. Mediation shall be initiated by delivering a written request for mediation to the other party. Within five (5) days of receipt of such request, the parties shall select a mutually agreeable mediator and designate mutually agreeable rules of mediation. If the parties cannot agree upon an mediator within five (5) days, a mediator may be appointed by the presiding judge, Circuit Court for Gilliam County, upon the request of either party submitted in accordance with ORS 36.600 to 36.740. If the parties have not designated mutually agreeable rules of mediation at such time as the arbitrator is appointed, the arbitrator shall adopt rules. Timely submission of the request shall stay the effect of Paragraph 10.05.E.”**

**B. Action on payment bond or public works bonds shall comply with ORS 279C.600 through 279C.625.**

17.05 B Add the following after 17.05 A.

**SC17.05B This agreement will be construed as to both validity and performance and will be enforced in accordance with and governed by the laws of the State of Oregon. Venue for any litigation arising from the interpretation or enforcement of this agreement shall be laid in the Circuit Court of the State of Oregon for the County of Gilliam.**

17.07 Add the following after 17.06

**SC17.07 Contractor will abide by all local, State and Federal regulations with regard to environmental rules. For this project, Oregon DEQ rules regarding lead and asbestos containing materials may apply. If such materials are noted, the owner will retain an licensed abatement contractor to address the hazard.**

**SC17.07 A: In compliance with the provisions of ORS 279C.525, the following is a list of federal, state and local agencies, of which the District has knowledge, that have enacted ordinances or regulations dealing with the prevention of environmental pollution and the preservation of natural resources that may affect the performance of the contract:**

**FEDERAL AGENCIES:**

- **Agriculture, Department of**
  - o **Forest Service**
  - o **Soil Conservation Service**
- **Defense, Department of**
  - o **Army Corps of Engineers**
- **Environmental Protection Agency**
- **Interior, Department of**
  - o **Bureau of Sport Fisheries and Wildlife**
    - o **Bureau of Outdoor Recreation**
  - o **Bureau of Land Management**
  - o **Bureau of Indian Affairs**
  - o **Bureau of Reclamation**
- **Labor, Department of**
  - o **Occupational Safety and Health Administration**
- **Transportation, Department of**
  - o **Coast Guard**
  - o **Federal Highway Administration**

**STATE AGENCIES:**



- **Agriculture, Department of**
- **Environmental Quality, Department of**
- **Fish and Wildlife, Department of**
- **Forestry, Department of**
- **Geology and Mineral Industries, Department of**
- **Human Resources, Department of**
- **Land Conservation and Development Commission**
- **Soil and Water Conservation Commission**
- **State Engineer**
- **State Land Board**
- **Water Resources Board**

**LOCAL AGENCIES:**

- **City**
- **County**
- **Port Districts**
- **County Service Districts**
- **Sanitary Districts**
- **Water Districts**
- **Fire Protection Districts**

**SC17.08 Assignment or Transfer Restricted:**

**Unless otherwise provided in the Contract, the Contractor shall not assign, sell, dispose of, or transfer rights, or delegate duties under the Contract, either in whole or in part, without the Contracting Agency's prior Written consent. Unless otherwise agreed by the Contracting Agency in Writing, such consent shall not relieve the Contractor of any obligations under the Contract. Any assignee or transferee shall be considered the agent of the Contractor and be bound to abide by all provisions of the Contract. If the Contracting Agency consents in Writing to an assignment, sale, disposal or transfer of the Contractor's rights or delegation of Contractor's duties, the Contractor and its surety, if any, shall remain liable to the Contracting Agency for complete performance of the Contract as if no such assignment, sale, disposal, transfer or delegation had occurred unless the Contracting Agency otherwise agrees in Writing**

# Change Order

No. 0X

Date of Issuance: TBD Effective Date: TBD

Project: POA Flex Building	Owner: Port of Arlington	Owner's Contract No.: N/A
Contract: Construction Contract		Date of Contract: xx
Contractor: TBD		Engineer's Project No.: 2017-015

**The Contract Documents are modified as follows upon execution of this Change Order:**

Description:

**Attachments (list documents supporting change):**

**CHANGE IN CONTRACT PRICE:**

Original Contract Price:

[Increase] [Decrease] from previously approved  
Change Orders No. \_\_\_\_\_ to No. \_\_\_\_\_:

\$ 0

Contract Price prior to this Change Order:

\$ \_\_\_\_\_

[Increase] [~~Decrease~~] of this Change Order:

\$ \_\_\_\_\_

Contract Price incorporating this Change

\$ \_\_\_\_\_

**CHANGE IN CONTRACT TIMES:**

Original Contract Times:  Working  Calendar days

Substantial completion (days or date): 230

Ready for final payment (days or date): 260

[Increase] [Decrease] from previously approved Change Orders  
No. \_\_\_\_\_ to No. \_\_\_\_\_:

Substantial completion (days): 0

Ready for final payment (days): 0

Contract Times prior to this Change Order:

Substantial completion (days or date): 230

Ready for final payment (days or date): 260

[Increase] [~~Decrease~~] of this Change Order:

Substantial completion (days or date): -

Ready for final payment (days or date): -

Contract Times with all approved Change Orders:

Substantial completion (days or date): -

Ready for final payment (days or date): -

RECOMMENDED:

By: \_\_\_\_\_  
Engineer (Authorized Signature)

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

ACCEPTED:

By: \_\_\_\_\_  
Owner (Authorized Signature)

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

ACCEPTED:

By: \_\_\_\_\_  
Contractor (Authorized Signature)

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

**CHANGE ORDER DOCUMENTATION**  
(To be completed by the Contractor when requested by the Engineer)

**Project/Contract:** POA Flex Bulding

**Proposed Change Order No.:** \_\_\_\_\_ **Date:** \_\_\_\_\_

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**Change Order Description:** \_\_\_\_\_

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**Labor:** (Provide detailed breakdown of all labor cost, i.e., hours, rates, and classification):

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Subtotal Labor: \$ \_\_\_\_\_  
\_\_\_\_\_ % Overhead and Profit Labor: \$ \_\_\_\_\_

**Equipment:** (Provide detailed breakdown of all equipment cost, i.e., hours, rates, and classification):

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Subtotal Equipment: \$ \_\_\_\_\_  
\_\_\_\_\_ % Overhead and Profit Equipment: \$ \_\_\_\_\_

**Materials:** (Provide detailed breakdown of all materials associated with this Change Order):

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Subtotal Materials: \$ \_\_\_\_\_

\_\_\_\_\_ % Overhead and Profit Materials: \$ \_\_\_\_\_

**Subcontract Cost:** (Attach this form for all subcontract work associated with this Change Order Item):

---

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Subtotal Subcontract Cost: \$ \_\_\_\_\_

\_\_\_\_\_ % Overhead and Profit Subcontract: \$ \_\_\_\_\_

**Other:** (Provide detailed description): \_\_\_\_\_

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Subtotal Other: \$ \_\_\_\_\_

\_\_\_\_\_ % Overhead and Profit Other: \$ \_\_\_\_\_

**TOTAL ESTIMATED COST OF PROPOSED CHANGE ORDER: \$ \_\_\_\_\_**

**UNIT PRICE (If applicable): \$ \_\_\_\_\_**

**Proposed Contract Time Change Associated with this Change Order:**

\_\_\_\_\_ days. (*Provide Justification and Description*):

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# Field Order

No. \_\_\_\_\_

Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_

Project: POA Flex Building	Owner: Port of Arlington	Owner's Contract No.: N/A
Contract: Construction Contract		Date of Contract:
Contractor:		Engineer's Project. No.: 2017- 015

**Attention:**

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: \_\_\_\_\_ (Specification Section(s)) \_\_\_\_\_ (Drawing(s) / Detail(s))

Description:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Attachments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Engineer: \_\_\_\_\_

Receipt Acknowledged by Contractor: \_\_\_\_\_ Date: \_\_\_\_\_

Copy to Owner

# **PWR RATES**

**(Selected portions of rates published July 2017)**

# PREVAILING WAGE RATES

for

## Public Works Contracts in Oregon



**OREGON BUREAU OF LABOR AND INDUSTRIES**

**Brad Avakian  
Commissioner  
Bureau of Labor and Industries**

**Effective: July 1, 2017**

## TABLE OF CONTENTS

JULY 1, 2017

How to Look up a Rate/BOLI Offices.....	1
Public Works Bonds.....	2
PWR Survey Wage Rate Appeal Process.....	3
PWR Required Postings.....	4
Map of Prevailing Wage Rate Regions.....	5
<b>Occupations by Regions</b>	
Region 1 - Clatsop, Columbia and Tillamook Counties.....	6
Region 2 - Clackamas, Multnomah and Washington Counties.....	8
Region 3 - Polk, Marion and Yamhill Counties.....	10
Region 4 - Benton, Lincoln and Linn Counties.....	12
Region 5 - Lane County.....	14
Region 6 - Douglas County.....	16
Region 7 - Coos and Curry Counties.....	18
Region 8 - Jackson and Josephine Counties.....	20
Region 9 - Hood River, Sherman and Wasco Counties.....	22
Region 10 - Crook, Deschutes and Jefferson Counties.....	24
Region 11 - Klamath and Lake Counties.....	26
Region 12 - Gilliam, Grant, Morrow, Umatilla and Wheeler Counties.....	28
Region 13 - Baker, Union and Wallowa Counties.....	30
Region 14 - Harney and Malheur Counties.....	32
Appendix.....	35
List of Ineligible Contractors.....	53
Forms.....	59

BOLI forms necessary to comply with ORS 279C.800 through ORS 279C.870 may be found in the back of this booklet. Contractors are encouraged to use and keep on file the forms provided as master copies for use on future prevailing wage rate projects.

**All of the information in this booklet can be accessed and printed from the Internet at: [www.oregon.gov/BOLI](http://www.oregon.gov/BOLI)**

Pursuant to ORS 279C.800 to ORS 279C.870, the prevailing wage rates contained in this booklet have been adopted for use on public works contracts in Oregon. Additional copies of this booklet are available at cost, plus postage.



# HOW TO LOOK UP A RATE

**1. When was the project first advertised for bid?**

For purposes of compliance with Oregon’s prevailing wage rate laws, the rates in effect at the time the bid specifications are first advertised are those that apply for the duration of the project. (See OAR 839-025-0020(6) for information about projects using a CM/GC.)

**2. What type of work is being performed by the employee?**

Using the booklet, [Definitions of Covered Occupations](#) find the definition that most closely matches the actual work being performed by the worker. If you have any questions about work classifications, contact BOLI at the number below.

**3. Where is the work being performed – what region?**

Find the occupation in the correct region pages associated with the county where the project construction is taking place.

**4. Is there a rate listed next to the classification?**

If so, use it. The prevailing wage rate is made up of an hourly base rate and an hourly fringe rate; it is the combination of these two amounts that must be paid to the worker.

**5. If the book directs you to “See Appendix,” go to the back of the book and use the rate listed in the Appendix pages.** It may include a group number, shift differential, hazard pay and/or zone pay which are added to the hourly base rate.

**6. Apprentices** must be paid the full fringe rate in those regions where the appendix rate does not apply. However, if the book directs you to "See Appendix," and the worker is registered in a bona fide apprenticeship program, **you may contact BOLI at (971) 673-0839** for the applicable hourly fringe rate.

**7. If you still don’t know CALL BOLI at (971) 673-0839.**

For specific information or questions regarding the prevailing wage law, you may obtain a “Prevailing Wage Rate Laws” handbook by contacting the nearest Oregon Bureau of Labor and Industries office listed below. An order form is in the back of this booklet.

BOLI Office Locations		
Eugene	1400 Executive Parkway, Suite 200 Eugene, OR 97401	(541) 686-7623
Portland	800 NE Oregon St., #1045 Portland, OR 97232	(971) 673-0761
Salem	3865 Wolverine St. NE, Bldg. E-1 Salem, OR 97305	(503) 378-3292

# PUBLIC WORKS BONDS

**EVERY CONTRACTOR AND SUBCONTRACTOR** who works on public works projects subject to the prevailing wage rate (PWR) law is required to file a **\$30,000** "**PUBLIC WORKS BOND**" with the Construction Contractor's Board (CCB). (ORS 279C.836) This includes flagging and landscaping companies, temporary employment agencies, and sometimes sole proprietors.

- This bond is to be **USED EXCLUSIVELY FOR UNPAID WAGES** determined to be due by the Bureau of Labor and Industries (BOLI).
- The bond **MUST** be filed **BEFORE STARTING WORK** on a prevailing wage rate project.
- The bond is in effect **CONTINUOUSLY** (do not have to have one per project).
- **BEFORE PERMITTING A SUBCONTRACTOR TO START WORK** on a public works project, **CONTRACTORS MUST VERIFY** their subcontractors have either filed the bond, or have elected not to file a public works bond due to a bona fide exemption.
- A public works bond is in addition to any other required bond the contractor or subcontractor is required to obtain.

## Exemptions:

- Allowed for contractors that are certified disadvantaged, minority, women or emerging small business enterprises, for the first FOUR years of certification;
  - Exempt contractor must still file written verification of certification with the CCB, and give the CCB written notice that they elect not to file a bond.
- For projects with a total project cost of \$100,000 or less, a public works bond is not required. (Note this is the total project cost, not an individual contract amount.)
  - The Prime Contractor must give written notice to the public agency that they elect not to file a public works bond.
  - Subcontractors must give written notice to the prime contractor that they elect not to file a public works bond.
- Emergency projects, as defined in ORS 279A.010(f).

## ORS 279C.830(3) and (4) require:

That the **specifications** for every contract for public works shall contain a provision stating that the contractor and every subcontractor must have a public works bond filed with the CCB before starting work on the project, unless otherwise exempt.

**Every contract awarded** by a contracting agency shall contain a provision requiring the contractor:

- To have a public works bond filed with the CCB before starting work on the project, unless otherwise exempt;
- To include in every subcontract a provision requiring the subcontractor to have a public works bond filed with the CCB before starting work on the project unless otherwise exempt.

# PWR SURVEY WAGE RATE APPEAL PROCESS

- 1) Anyone wishing to challenge or appeal a survey rate determination should submit their request in writing to the commissioner.
- 2) The appeal should include:
  - a) a complete description of the “problem,” including the affected trade(s), and documentation or evidence (if available) supporting why the rate determination is incorrect
  - b) recommendations for how the rate could be more accurately determined.
- 3) The written appeal will be reviewed by the Wage and Hour Division which will recommend to the commissioner a course of action and proposed time frame for addressing the issue (such as a recommendation that further information be obtained, an investigation or study of the matter be conducted, a rate amendment or correction be issued, the next survey be modified, etc.).
- 4) The commissioner will review the division’s recommendation and either approve, disapprove or modify the recommendation. (The PWR Advisory Committee may be consulted in some matters as deemed appropriate by the commissioner.)
- 5) The requesting party will be notified of the commissioner’s decision.

# **PWR REQUIRED POSTINGS**

## **ALL CONTRACTORS AND SUBCONTRACTORS**

### **PREVAILING WAGE RATES**

Each and every contractor and subcontractor engaged in work on a public works must post the applicable prevailing wage rates for that project in a conspicuous place at the work site so workers have ready access to the information. ORS 279C.840(4); OAR 839-025-0033(1).

### **DETAILS OF FRINGE BENEFIT PROGRAMS**

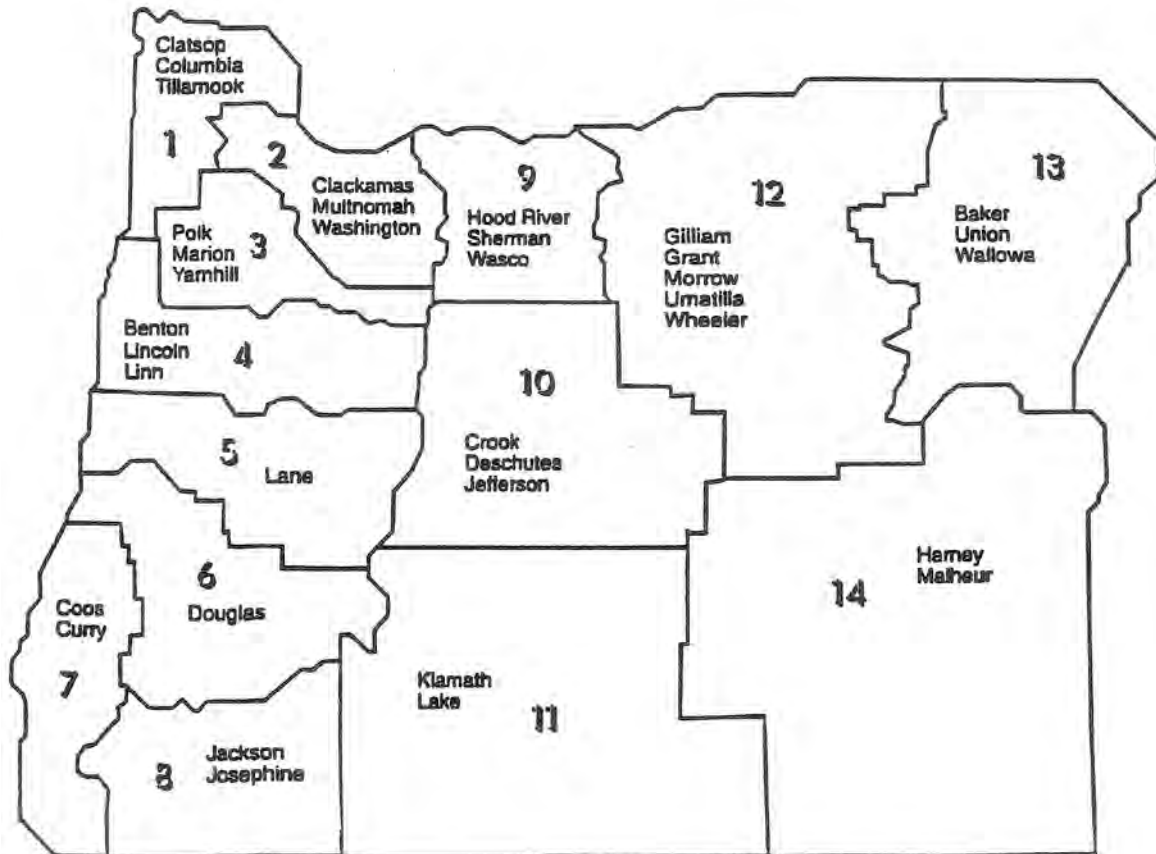
When a contractor or subcontractor provides for or contributes to a health and welfare plan or a pension plan, or both, for the contractor or subcontractor's employees who are working on a public works project, the details of all fringe benefit plans or programs must be posted on the work site. The posting must include a description of the plan or plans, information about how and where claims can be made and where to obtain more information. The notice must be posted in a conspicuous place at the work site in the same location as the prevailing wage rates (see above). ORS 279C.840(5); OAR 839-025-0033(2)

### **WORK SCHEDULE**

Contractors and subcontractors must give workers the regular work schedule (days of the week and number of hours per day) in writing, before beginning work on the project. Contractors and subcontractors may provide the schedule at the time of hire, prior to starting work on the contract, or by posting the schedule in a location frequented by employees, along with the prevailing wage rate information and any fringe benefit information. If an employer fails to give written notice of the worker's schedule, the work schedule will be presumed to be a five-day schedule. The schedule may only be changed if the change is intended to be permanent and is not designed to evade the PWR overtime requirements. ORS 279C.540(2); OAR 839-025-0034.

# PREVAILING WAGE RATES OCCUPATIONS BY REGIONS

## PREVAILING WAGE RATE REGIONS



REGION #12  
 Gilliam, Grant, Morrow, Umatilla and Wheeler Counties

Using the booklet, [Definitions of Covered Occupations](#), find the definition that most closely matches the actual work being performed by the worker.

OCCUPATION	BASIC HOURLY RATE	FRINGE RATE
Asbestos Worker/Insulator	See Appendix	See Appendix
Boilermaker	See Appendix	See Appendix
Bricklayer/Stonemason	See Appendix	See Appendix
Bridge and Highway Carpenter (See Carpenter Group 5)	See Appendix	See Appendix
Carpenter Group 1 & 2	See Appendix	See Appendix
Cement Mason	See Appendix	See Appendix
Diver	See Appendix	See Appendix
Diver Tender	See Appendix	See Appendix
Dredger	See Appendix	See Appendix
Drywall, Lather, Acoustical Carpenter & Ceiling Installer	See Appendix	See Appendix
Drywall Taper	\$28.67	\$13.41
Electrician	See Appendix	See Appendix
Elevator Constructor, Installer and Mechanic	See Appendix	See Appendix
Fence Constructor (Non-metal)	\$23.96	\$10.46
Fence Erector (Metal)	\$20.50	\$5.09
Flagger (See Laborer Group 3)	See Appendix	See Appendix
Glazier	\$29.81	\$13.94
Hazardous Materials Handler/Mechanic	See Appendix	See Appendix
Highway and Parking Striper	See Appendix	See Appendix
Ironworker	See Appendix	See Appendix
Laborer Group 1	See Appendix	See Appendix
Laborer Group 2	See Appendix	See Appendix
Laborer Group 3	See Appendix	See Appendix
Landscape Laborer/Technician	\$17.16	\$4.17
Limited Energy Electrician	\$30.03	\$10.49
Line Constructor	See Appendix	See Appendix
Marble Setter	See Appendix	See Appendix
Millwright Group 1 & 2	\$29.32	\$10.68
Painter	See Appendix	See Appendix
Piledriver (See Carpenter Group 6)	See Appendix	See Appendix
Plasterer and Stucco Mason	See Appendix	See Appendix
Plumber/Pipefitter/Steamfitter	See Appendix	See Appendix
Power Equipment Operator Group 1	See Appendix	See Appendix
Power Equipment Operator Group 1A	See Appendix	See Appendix
Power Equipment Operator Group 1B	See Appendix	See Appendix
Power Equipment Operator Group 2	See Appendix	See Appendix
Power Equipment Operator Group 3	See Appendix	See Appendix
Power Equipment Operator Group 4	See Appendix	See Appendix
Power Equipment Operator Group 5	See Appendix	See Appendix
Power Equipment Operator Group 6	See Appendix	See Appendix

REGION #12  
 Gilliam, Grant, Morrow, Umatilla and Wheeler Counties

Using the booklet, [Definitions of Covered Occupations](#), find the definition that most closely matches the actual work being performed by the worker.

OCCUPATION	BASIC HOURLY RATE	FRINGE RATE
Roofer	\$24.43	\$8.76
Sheet Metal Worker	See Appendix	See Appendix
Soft Floor Layer	\$24.29	\$10.91
Sprinkler Fitter	See Appendix	See Appendix
Tender to Mason Trades (Brick and Stonemason, Mortar Mixer, Hod Carrier)	See Appendix	See Appendix
Tender to Plasterer and Stucco Mason	\$25.36	\$12.02
Testing, Adjusting, and Balancing (TAB) Technician (See Sheet Metal Worker or Plumber/Pipefitter/Steamfitter)	See Appendix	See Appendix
Tilesetter/Terrazzo Worker: Hard Tilesetter	\$27.41	\$16.72
Tile, Terrazzo, and Marble Finisher	\$22.33	\$13.21
Truck Driver – All Groups	\$20.54	\$7.16

# APPENDIX

JULY 1, 2017

## Collectively Bargained Rates

(To be used only when referred to in the Regions pages 6-33)





## JULY 1, 2017 APPENDIX

*The Appendix rates are Collectively Bargained Rates to be used **ONLY** for Regions/Trades specified in pages 6 through 33. Refer to pages 6 through 33 **BEFORE** using rates in this section. Rates in this section may include premium pay such as shift differential, hazard pay and/or a zone pay differential which is added to the hourly base rate.*

*Using the booklet, [Definitions of Covered Occupations](#), find the definition and group number, if applicable, that most closely matches the actual work being performed by the worker.*

Asbestos Worker/Insulator .....	38
Boilermaker.....	38
Bricklayer/Stonemason.....	38
Bridge and Highway Carpenter (See Carpenter Group 5) .....	38
Carpenter .....	38
Cement Mason .....	39
Diver .....	39
Diver Tender .....	39
Dredger.....	40
Drywall, Lather, Acoustical Carpenter & Ceiling Installer .....	40
Drywall Taper (See Painter & Drywall Taper) .....	45
Electrician .....	41
Elevator Constructor, Installer and Mechanic.....	43
Glazier .....	43
Hazardous Materials Handler .....	43
Highway/Parking Striper .....	43
Ironworker.....	43
Laborer.....	43
Limited Energy Electrician.....	44
Line Constructor.....	45
Marble Setter.....	45
Millwright Group 1 & 2 (See Carpenter Group 3 & 4) .....	38
Painter .....	45
Piledriver (See Carpenter Group 6).....	38
Plasterer and Stucco Mason.....	45
Plumber/Pipefitter/Steamfitter .....	46
Power Equipment Operator .....	46
Rofer.....	48
Sheet Metal Worker .....	48
Soft Floor Layer .....	49
Sprinkler Fitter.....	49
Tender to Mason Trades (Brick and Stonemason, Mortar Mixer, Hod Carrier).....	49
Tender to Plasterer and Stucco Mason .....	49
Testing and Balancing (TAB) Technician .....	50
Tilesetter/Terrazzo Worker: Hard Tilesetter.....	50
Tile, Terrazzo, and Marble Finisher .....	50
Truck Driver.....	50
MAP: Power Equipment Operator, Zone 1.....	51

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
--------------	---------------------------------	-----------------------------------	--------------	---------------------------------	-----------------------------------

**ASBESTOS WORKER/INSULATOR**

**45.42    21.25**

Firestop Containment    **30.02    14.78**

**BOILERMAKER**                    **36.69    28.75**

**BRICKLAYER/STONEMASON**

**36.03    19.59**

(This trade is tended by "Tenders to Mason Trades")

(Add \$1.00 per hour to Fringe for Refractory repair work)

**CARPENTER**

Zone 1 (Base Rate)

Group 1	<b>36.63</b>	<b>16.25</b>
Group 2	<b>36.78</b>	<b>16.25</b>
Group 3	<b>37.16</b>	<b>16.25</b>
Group 4	<b>37.34</b>	<b>16.25</b>
Group 5	<b>37.16</b>	<b>16.25</b>
Group 6	<b>37.70</b>	<b>16.25</b>

Zone Differential for Carpenters  
(Add to Zone 1 Base Rate)

Zone 2	<b>.85</b> per hour
Zone 3	<b>1.25</b> per hour
Zone 4	<b>1.70</b> per hour
Zone 5	<b>2.00</b> per hour
Zone 6	<b>3.00</b> per hour
Zone 7	<b>5.00</b> per hour

- Zone 1: Projects located within 30 miles of the respective city hall of the cities listed.
- Zone 2: More than 30 miles but less than 40 miles.
- Zone 3: More than 40 miles but less than 50 miles.
- Zone 4: More than 50 miles but less than 60 miles.
- Zone 5: More than 60 miles but less than 70 miles.
- Zone 6: More than 70 miles but less than 100 miles.
- Zone 7: More than 100 miles.

**CARPENTER** (continued)

Reference Cities for Group 1 and 2 Carpenters

Albany	Goldendale	Madras	Roseburg
Astoria	Grants Pass	Medford	Salem
Baker City	Hermiston	Newport	The Dalles
Bend	Hood River	Ontario	Tillamook
Brookings	Klamath Falls	Pendleton	Vancouver
Burns	La Grande	Portland	
Coos Bay	Lakeview	Port Orford	
Eugene	Longview	Reedsport	

Group 3  
(Millwright Group-I)

Group 4  
(Millwright Group-II)

Zones for Groups 3 and 4 Carpenter are determined by the distance between the project site and **either**

- 1) The worker's residence; **or**
- 2) City Hall of a reference city listed for the appropriate group shown, whichever is closer

Reference Cities for Group 3 and 4 Carpenters

Eugene	Medford	Portland	Vancouver
Longview	North Bend	The Dalles	

Group 5  
(Bridge & Highway  
Carpenter)

Group 6  
(Piledriver)

Zones for Groups 5 and 6 Carpenter are determined by the distance between the project site and **either**

- 1) The worker's residence; **or**
- 2) City Hall of a reference city listed for the appropriate group shown, whichever is closer

Reference Cities for Group 5 and 6 Carpenters

Bend	Longview	North Bend
Eugene	Medford	Portland

**Note:** All job or project locations shall be computed (determined) on the basis of road miles and in the following manner. A mileage measurement will start at the entrance to the respective city hall, facing the project (if possible), and shall proceed by the normal route (shortest time, best road) to the geographical center on the highway, railroad, and street construction projects (end of measurement). On all project contracts, the geographical center where the major portion of the construction is located, shall be considered the center of the project (end measurement).

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**CARPENTER** (continued)

Welders receive \$.75/hour above their group's rate.

When working with creosote and other toxic, treated wood and steel material, workers shall receive \$.25/hour premium pay for minimum of eight (8) hours.

When working in sheet pile coffer dams or cells up to the external water level, Group 6 workers shall receive \$.15/hour premium pay for minimum of eight (8) hours.

**CEMENT MASON**

(This trade is tended by "Concrete Laborer")

Zone A (Base Rate)

Group 1	<b>31.50</b>	<b>19.62</b>
Group 2	<b>32.19</b>	<b>19.62</b>
Group 3	<b>32.19</b>	<b>19.62</b>
Group 4	<b>32.87</b>	<b>19.62</b>

Zone Differential for Cement Mason

(Add to Basic Hourly Rate)

Zone A	<b>3.00</b> per hour
Zone B	<b>5.00</b> per hour
Zone C	<b>10.00</b> per hour

Zone A: Projects located 60-79 miles of the respective city hall of the Reference Cities listed below.

Zone B: Projects located 80-99 miles of the respective city hall of the Reference Cities listed below.

Zone C: Projects located 100 or more miles of the respective city hall of the Reference Cities listed below.

Reference Cities for Zones A-C (Cement Mason)

Bend	Eugene	Portland	The Dalles
Corvallis	Medford	Salem	Vancouver

When a contractor takes current employees to a project that is located more than 59 miles from the city hall of the Reference City that is closest to the contractor's place of business, Zone Pay is to be paid for the distance between the city hall of the identified Reference City and the project site.

"Contractor's place of business" shall include not only contractor's principal place of business but also contractor's area office(s) that support contractor's operations in a geographical region. Such area office(s) shall not include project offices(s) established for the duration of a particular project.

**CEMENT MASON** (continued)

**Note:** All miles are to be determined on the basis of road miles using the normal route (shortest time – best road), from the city hall of the Reference City closest to the contractor's place of business and the project, or, city hall of the Reference City closest to the current employee's residence and the project.

**DIVER & DIVER TENDER**

Zone 1 (Base Rate)

<b>DIVER</b>	<b>86.89</b>	<b>16.25</b>
<b>DIVER TENDER</b>	<b>42.89</b>	<b>16.25</b>

- 1) For those workers who reside within a reference city below, their zone pay shall be computed from the city hall of the city wherein they reside.
- 2) For those workers who reside nearer to a project than is the city hall of any reference city below, the mileage from their residence may be used in computing their zone pay differential.
- 3) The zone pay for all other projects shall be computed from the city hall of Portland.

Zone Differential for Diver/Diver Tender

(Add to Zone 1 Base Rate)

Zone 2	<b>.85</b> per hour
Zone 3	<b>1.25</b> per hour
Zone 4	<b>1.70</b> per hour
Zone 5	<b>2.00</b> per hour
Zone 6	<b>3.00</b> per hour
Zone 7	<b>5.00</b> per hour

Zone 1: Projects located within 30 miles of city hall of the reference cities listed.

Zone 2: More than 30 miles, but less than 40 miles.

Zone 3: More than 40 miles, but less than 50 miles.

Zone 4: More than 50 miles, but less than 60 miles.

Zone 5: More than 60 miles, but less than 70 miles.

Zone 6: More than 70 miles, but less than 100 miles.

Zone 7: More than 100 miles from the city hall of employee's home local.

Reference Cities for Diver/Diver Tender

Astoria	Klamath Falls	Newport	Roseburg
Bend	Longview	North Bend	Salem
Eugene	Medford	Portland	The Dalles

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**DIVER & DIVER TENDER** (continued)

**Note:** All job or project locations shall be computed (determined) on the basis of road miles and in the following manner. A mileage measurement will start at the entrance to the respective city hall, facing the project (if possible), and shall proceed by the normal route (shortest time, best road) to the geographical center on the highway, railroad, and street construction projects (end of measurement). On all project contracts, the geographical center where the major portion of the construction is located, shall be considered the center of the project (end measurement).

Depth Pay and Enclosure Pay are added to the Divers' Basic Hourly Rate to obtain the Total Hourly Rate for the Diver.

Basic Hourly Rate	+	Hourly Depth Pay	+	Hourly Enclosure Pay	=	Diver Total Hourly Pay Rate
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Diver Depth Pay:

Depth of Dive      Hourly Depth Pay

50-100 ft.	\$1.00 per foot over 50 feet
101-150 ft.	\$1.50 per foot over 100 feet
151-200 ft.	\$2.00 per foot over 150 feet

Depth shall be figured from the surface to the actual depth where the diving work is being performed.

Diver Enclosure Pay (working without vertical escape):

Distance Traveled In the Enclosure      Hourly Enclosure Pay

5-50ft.	\$0.50/hr. up to \$4.00 maximum per day
50-100ft.	\$1.13/hr. up to \$9.00 maximum per day
100-150ft.	\$2.13/hr. up to \$17.00 maximum per day
150-200ft.	\$4.63/hr. up to \$37.00 maximum per day
200-300ft.	\$4.63/hr. up to \$37.00 maximum per day, plus \$0.40 per foot traveled in enclosure.
300-450ft.	\$4.63/hr. up to \$37.00 maximum per day, plus \$0.80 per foot traveled in enclosure.
450-600ft.	\$4.63/hr. up to \$37.00 maximum per day, plus \$1.60 per foot traveled in enclosure.

**DREDGER**

Zone A (Base Rate)

Leverman (Hydraulic & Clamshell)	<b>45.96</b>	<b>14.35</b>
Assistant Engineer (Watch Engineer, Mechanic Machinist)	<b>42.80</b>	<b>14.35</b>
Tenderman (Boatman Attending Dredge Plant) Fireman	<b>41.31</b>	<b>14.35</b>
Fill Equipment Operator	<b>40.14</b>	<b>14.35</b>
Assistant Mate	<b>37.44</b>	<b>14.35</b>

Zone Differential for Dredgers (Add to Zone A Base Rate)

Zone B	<b>3.00</b> per hour
Zone C	<b>6.00</b> per hour

Zone mileage based on road miles:

- Zone A: Center of jobsite to no more than 30 miles from the city hall of Portland.
- Zone B: More than 30 miles but not more than 60 miles.
- Zone C: Over 60 miles.

**DRYWALL, LATHER, ACOUSTICAL CARPENTER & CEILING INSTALLER**

Zone 1 (Base Rate)

1. DRYWALL INSTALLER	<b>36.92</b>	<b>15.96</b>
2. LATHER, ACOUSTICAL CARPENTER & CEILING INSTALLER	<b>36.92</b>	<b>15.96</b>

Zone Differential for Drywall, Lather, Acoustical Carpenter & Ceiling Installer

(Add to Zone 1 Base Rate)

Zone mileage based on road miles:

Zone 2	31-40 miles	<b>.85</b> per hour
Zone 3	41-50 miles	<b>1.25</b> per hour
Zone 4	51-60 miles	<b>1.70</b> per hour
Zone 5	61-70 miles	<b>2.00</b> per hour
Zone 6	71-100 miles	<b>3.00</b> per hour
Zone 7	101 or more	<b>5.00</b> per hour

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**DRYWALL, LATHER, ACOUSTICAL CARPENTER & CEILING INSTALLER** (continued)

The correct transportation allowance shall be based on road mileage from the City Hall of the local union having jurisdiction of the job or other transportation reference cities herein listed.

Reference Cities for Drywall, Lather, Acoustical Carpenter & Ceiling Installer

Albany	Coquille	Medford	Roseburg
Astoria	Eugene	Newport	Salem
Baker	Grants Pass	North Bend	Seaside
Bandon	Hermiston	Pendleton	The Dalles
Bend	Klamath Falls	Portland	Tillamook
Brookings	Kelso-Longview	Reedsport	Vancouver

**ELECTRICIAN**

Area 1

Electrician	<b>29.26</b>	<b>13.52</b>
Cable Splicer	<b>32.19</b>	<b>13.70</b>

Reference Counties Area 1

Malheur

Area 2

Electrician	<b>40.90</b>	<b>20.06</b>
Cable Splicer	<b>42.95</b>	<b>20.12</b>

Reference Counties Area 2

Baker	Grant	Umatilla	Wallowa
Gilliam	Morrow	Union	Wheeler

Add 50% of the base rate when workers are required to work under the following conditions:

1. Under compressed air with atmospheric pressure exceeding normal pressure by at least 10%.
2. From trusses, swing scaffolds, bosun's chairs, open platforms, unguarded scaffolds, open ladders, frames, tanks, stacks, silos and towers where the workman is subject to a direct fall of (a) more than 60 feet or (b) into turbulent water under bridges, powerhouses or spillway faces of dams.

**ELECTRICIAN** (continued)

Area 3

Electrician	<b>37.55</b>	<b>17.43</b>
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Reference Counties Area 3

Coos	Douglas (a)	Lincoln
Curry	Lane (a)	

(a) Those portions of Lane and Douglas lying **west** of a line running North and South from the NE corner of Coos County to the SE corner of Lincoln County.

Shift Differential

1 <sup>st</sup> Shift "day"	Between the hours of 8:00am and 4:30pm	8 hours pay for 8 hours work
2 <sup>nd</sup> Shift "swing"	Between the hours of 4:30pm and 1:00am	8 hours pay for 8 hours work plus 17% for all hours worked
3 <sup>rd</sup> Shift "Graveyard"	Between the hours of 12:30am and 9:00am	8 hours pay for 8 hours work plus 31% for all hours worked.

When workers are required to work under compressed air or where gas masks are required, or to work from trusses, all scaffolds including mobile elevated platforms, any temporary structure, bosun's chair or on frames, stacks, towers, tanks, within 15' of the leading edges of any building at a distance of:

50 – 75 feet to the ground	Add 1 ½ x the base rate
75+ feet to the ground	Add 2 x the base rate

High Time is not required to be paid on any permanent structure with permanent adequate safeguards (handrails, mid-rails, and toe guards). Any vehicle equipped with outriggers are exempted from this section.

Area 4

Electrician	<b>39.91</b>	<b>18.89</b>
Cable Splicer	<b>43.90</b>	<b>19.01</b>
Lighting Maintenance/ Material Handlers	<b>18.49</b>	<b>9.80</b>

**OREGON DETERMINATION 2017-02**

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**ELECTRICIAN** (continued)

Reference Counties Area 4

Benton	Jefferson	Marion
Crook	Lane (b)	Polk
Deschutes	Linn	Yamhill (c)

(b) That portion of Lane County lying **east** of a line running North and South from the NE corner of Coos County to the SE corner of Lincoln County.

(c) South half

Shift Differential

1 <sup>st</sup> Shift "day"	Between the hours of 8:00am and 4:30pm	8 hours pay for 8 hours work
2 <sup>nd</sup> Shift "swing"	Between the hours of 4:30pm and 1:00am	8 hours pay for 8 hours work plus 17% for all hours worked
3 <sup>rd</sup> Shift "Graveyard"	Between the hours of 12:30am and 9:00am	8 hours pay for 8 hours work plus 31.4% for all hours worked.

Area 5

Electrician	<b>40.20</b>	<b>23.38</b>
Electrical Welder	<b>44.22</b>	<b>23.50</b>
Material Handler/ Lighting Maintenance	<b>22.91</b>	<b>15.65</b>

Reference Counties Area 5

Clackamas	Hood River	Tillamook	Yamhill (d)
Clatsop	Multnomah	Wasco	
Columbia	Sherman	Washington	

(d) North Half

**ELECTRICIAN** (continued)

Shift Differential

1 <sup>st</sup> Shift "day"	Between the hours of 8:00am and 4:30pm	8 hours pay for 8 hours work
2 <sup>nd</sup> Shift "swing"	Between the hours of 4:30pm and 1:00am	8 hours pay for 8 hours work plus 17.3% for all hours worked
3 <sup>rd</sup> Shift "Graveyard"	Between the hours of 12:30am and 9:00am	8 hours pay for 8 hours work plus 31.4% for all hours worked.

**Zone Pay for Area 5 Electrician and Electrical Welder**

(Add to Basic Hourly Rate)

Zone mileage based on air miles:

Zone 1	31-50 miles	<b>1.50</b> per hour
Zone 2	51-70 miles	<b>3.50</b> per hour
Zone 3	71-90 miles	<b>5.50</b> per hour
Zone 4	Beyond 90	<b>9.00</b> per hour

There shall be a 30-mile free zone from downtown Portland City Hall and a similar 15-mile free zone around the following cities:

Astoria	Seaside	Tillamook
Hood River	The Dalles	

Further, the free zone at the Oregon coast shall extend along Hwy 101 west to the ocean Hwy 101 east 10 miles if not already covered by the above 15-mile free zone.

Area 6

Electrician	<b>32.69</b>	<b>16.52</b>
Lighting Maintenance and Material Handlers	<b>16.97</b>	<b>9.76</b>

Reference Counties Area 6

Douglas (e)	Jackson	Klamath
Harney	Josephine	Lake

(e) That portion of Douglas County lying **east** of a line running North and South from the NE corner of Coos County to the SE corner of Lincoln County.

**OREGON DETERMINATION 2017-02**

**TRADE**                      **HOURLY BASE RATE**    **HOURLY FRINGE RATE**

**TRADE**                      **HOURLY BASE RATE**    **HOURLY FRINGE RATE**

**ELECTRICIAN** (continued)

	<u>Shift Differential</u>	
1 <sup>st</sup> Shift "day"	Between the hours of 8:00am and 4:30pm	8 hours pay for 8 hours work
2 <sup>nd</sup> Shift "swing"	Between the hours of 4:30pm and 1:00am	8 hours pay for 8 hours work plus 7.5% for all hours worked
3 <sup>rd</sup> Shift "Graveyard"	Between the hours of 12:30am and 9:00am	8 hours pay for 8 hours work plus 15% for all hours worked.

When workers are required to work under compressed air or to work from trusses, scaffolds, swinging scaffolds, bosun's chair or on building frames, stacks or towers at a distance of 50 to 90 feet from the ground or supporting structures shall be paid 1-1/2 times the base rate of pay.

**ELEVATOR CONSTRUCTOR, INSTALLER AND MECHANIC**

Area 1

Mechanic                      **50.82**    **36.20**

Reference Counties Area 1

Baker                      Umatilla                      Union                      Wallowa

Area 2

Mechanic                      **51.03**    **37.37**

Reference Counties Area 2

All remaining Counties

**GLAZIER**                      **35.64**    **19.33**

(Add \$1.00 to base rate if safety belt is required by State safety regulations)

(Add \$4.00 to base rate for work done from a non-motorized single-man bosun chair)

**HAZARDOUS MATERIALS HANDLER**

**23.78**    **12.18**

**HIGHWAY/PARKING STRIPER**

**34.37**    **11.46**

Shift Differential

(Add \$1.50 to base rate for shifts that start between 3:00pm and 4:00am)

**IRONWORKER**

Zone 1 (Base Rate):                      **36.71**    **24.16**

Zone Differential for Ironworker  
(Add to Basic Hourly Rate)

- Zone 2    **3.75/hr.** or \$30.00 maximum per day
- Zone 3    **6.88/hr.** or \$55.00 maximum per day
- Zone 4    **9.38/hr.** or \$75.00 maximum per day

- Zone 1: Projects located within 45 miles of city hall in the reference cities listed below.
- Zone 2: More than 45 miles, but less than 60 miles.
- Zone 3: More than 60 miles, but less than 100 miles.
- Zone 4: More than 100 miles.

**Note:** Zone pay for Ironworkers shall be determined using AAA road mileage computed from the city hall of the reference cities listed below or the residence of the employee, whichever is nearer to the project.

Reference Cities

Medford                      Portland

**LABORER**

Zone A (Base Rate):

Group 1	<b>28.86</b>	<b>13.82</b>
Group 2	<b>29.94</b>	<b>13.82</b>
Group 3	<b>25.00</b>	<b>13.82</b>

**Note:** A Hazardous Waste Removal Differential must be added to the base rate if work is performed inside the boundary of a Federally Designated Hazardous Waste Site. A Group 1 base rate is used for General Laborer on such a site. For further information on this, call the Prevailing Wage Rate Coordinator at (971) 673-0839.



<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**LABORER** (continued)

Zone Differential for Laborers  
(Add to Zone A Base Rate)

Zone B	<b>.85</b> per hour
Zone C	<b>1.25</b> per hour
Zone D	<b>2.00</b> per hour
Zone E	<b>3.00</b> per hour
Zone F	<b>5.00</b> per hour

Zone A: Projects located within 30 miles of city hall in the reference cities listed.

Zone B: More than 30 miles but less than 40 miles.

Zone C: More than 40 miles but less than 50 miles.

Zone D: More than 50 miles but less than 80 miles.

Zone E: More than 80 miles but less than 100 miles.

Zone F: More than 100 miles.

Reference Cities for Laborer

Albany	Burns	Hermiston	Roseburg
Astoria	Coos Bay	Klamath Falls	Salem
Baker City	Eugene	Medford	The Dalles
Bend	Grants Pass	Portland	

**Note:** All job or project locations shall be computed (determined) on the basis of road miles and in the following manner. A mileage measurement will start at the entrance to the respective city hall, facing the project (if possible), and shall proceed by the normal route (shortest time, best road) to the geographical center on the highway, railroad, and street construction projects (end of measurement). On all other project contracts, the geographical center where the major portion of the construction is located, shall be considered the center of the project (end measurement).

**LIMITED ENERGY ELECTRICIAN**

<u>Area 1</u>	<b>20.00</b>	<b>8.85</b>
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Reference Counties Area 1

Malheur

<u>Area 2</u>	<b>31.50</b>	<b>18.35</b>
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Reference Counties Area 2

Baker	Grant	Umatilla	Wallowa
Gilliam	Morrow	Union	Wheeler

**LIMITED ENERGY ELECTRICIAN** (continued)

<u>Area 3</u>	<b>28.65</b>	<b>15.36</b>
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Reference Counties Area 3

Coos	Douglas (a)	Lincoln
Curry	Lane (a)	

(a) Those portions of Lane and Douglas lying **west** of a line running North and South from the NE corner of Coos County to the SE corner of Lincoln County.

<u>Area 4</u>	<b>28.88</b>	<b>14.37</b>
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Reference Counties Area 4

Benton	Jefferson	Marion
Crook	Lane (b)	Polk
Deschutes	Linn	Yamhill (c)

(b) That portion of Lane County lying **east** of a line running North and South from the NE corner of Coos County to the SE corner of Lincoln County.

(c) South half

<u>Area 5</u>	<b>32.78</b>	<b>18.98</b>
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Reference Counties Area 5

Clackamas	Hood River	Tillamook	Yamhill (d)
Clatsop	Multnomah	Wasco	
Columbia	Sherman	Washington	

(d) North Half

<u>Area 6</u>	<b>25.90</b>	<b>13.03</b>
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Reference Counties Area 6

Douglas (e)	Jackson	Klamath
Harney	Josephine	Lake

(e) That portion of Douglas County lying **east** of a line running North and South from the NE corner of Coos County to the SE corner of Lincoln County.

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**LINE CONSTRUCTOR**

Area 1

Group 1	<b>56.81</b>	<b>17.52</b>
Group 2	<b>50.72</b>	<b>17.28</b>
Group 3	<b>28.67</b>	<b>11.49</b>
Group 4	<b>43.62</b>	<b>13.80</b>
Group 5	<b>38.04</b>	<b>13.02</b>
Group 6	<b>32.97</b>	<b>12.82</b>
Group 7	<b>17.14</b>	<b>9.06</b>

Reference Counties Area 1

All counties except Malheur County

Area 2

Cable Splicer	<b>50.18</b>	<b>15.62</b>
Journeyman Lineman	<b>45.44</b>	<b>15.17</b>
Line Equip. Operator	<b>37.79</b>	<b>14.34</b>
Groundman	<b>26.83</b>	<b>12.04</b>

Reference County Area 2

Malheur County

**MARBLE SETTER**                      **37.03**      **19.59**

(This trade is tended by "Tile, Terrazzo, & Marble Finishers")

**PAINTER & DRYWALL TAPER**

COMMERCIAL PAINTING      **23.02**      **11.16**

INDUSTRIAL PAINTING      **24.22**      **11.16**

BRIDGE PAINTING              **28.27**      **11.16**

(Add \$0.75 to base rate for work over 60 ft. high on swing stage, mechanical climber, spider or bucket truck for all wage classifications)

(Add \$0.60 to base rate for sandblasting, spray painting and working in confined spaces)

DRYWALL TAPER

Zone A (Base Rate)

**35.48**      **14.02**

**PAINTER & DRYWALL TAPER** (continued)

Zone Differential for Drywall Taper  
(Add to Zone A Base Rate)

Zone B	<b>.85</b> per hour
Zone C	<b>1.25</b> per hour
Zone D	<b>1.70</b> per hour
Zone E	<b>2.00</b> per hour
Zone F	<b>3.00</b> per hour
Zone G	<b>5.00</b> per hour

Reference Cities and Dispatch Points for Drywall Taper

Astoria	Burns	Medford	The Dalles
Bend	Longview	Pendleton	

Local #10 11105 NE Sandy Blvd. Portland, OR 97220	Local #24 2659 Commercial St. SE Salem, OR 97302
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Local #1277  
541 Willamette, Suite 105  
Eugene, OR 97402

Zone A: Projects located within 30 miles of the respective city hall of the reference cities and dispatch points listed.

Zone B: More than 30 miles, but less than 40 miles.

Zone C: More than 40 miles, but less than 50 miles.

Zone D: More than 50 miles, but less than 60 miles.

Zone E: More than 60 miles, but less than 70 miles.

Zone F: More than 70 miles, but less than 100 miles.

Zone G: More than 100 miles.

**PLASTERER AND STUCCO MASON**

(This trade is tended by "Tenders to Plasterers")

Zone A (Base Rate)

Plasterer	<b>28.79</b>	<b>18.58</b>
Swinging Scaffold	<b>29.79</b>	<b>18.58</b>
Nozzleman	<b>30.79</b>	<b>18.58</b>

Zone Differential for Plasterer and Stucco Mason  
(Add to Zone A Base Rate)

Zone B	<b>.85</b> per hour
Zone C	<b>1.25</b> per hour
Zone D	<b>1.70</b> per hour
Zone E	<b>2.00</b> per hour
Zone F	<b>3.00</b> per hour
Zone G	<b>5.00</b> per hour
Zone H	<b>10.50</b> per hour for 8 hours

**OREGON DETERMINATION 2017-02**

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**PLASTERER AND STUCCO MASON** (continued)

- Zone A: Projects located within 30 miles of the respective city hall of the reference cities listed below.
- Zone B: More than 30 miles, but less than 40 miles.
- Zone C: More than 40 miles, but less than 50 miles.
- Zone D: More than 50 miles, but less than 60 miles.
- Zone E: More than 60 miles, but less than 70 miles.
- Zone F: More than 70 miles, but less than 100 miles.
- Zone G: More than 100 miles, but less than 300 miles.
- Zone H: More than 300 miles.

Reference Cities for Plasterer & Stucco Mason

Bend	Medford	Salem
Eugene	Portland	

**PLUMBER/PIPEFITTER/STEAMFITTER**

Area 1 **29.00** **14.32**

Reference Counties Area 1

Baker	Harney (a)	Malheur
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(a) Except that portion which lies North and West of a North-South line drawn from the town of John Day to a point five miles east of the town of Burns and three miles South of Burns thence on an airline through the town of Wagontire West to the county line.

(Add \$2.21 to base rate if it is possible for worker to fall 30 ft. or more, or if required to wear a fresh-air mask or similar equipment for 2 hours or more)

Zone Differential for Area 1  
Plumbers/Pipefitters/Steamfitters  
(Add to Base Rate)

Zone 1	<b>2.50</b>	per hour
Zone 2	<b>3.50</b>	per hour
Zone 3	<b>5.00</b>	per hour

Zone mileage based on road miles:

Zone 1: Forty (40) to fifty five (55) miles from City Hall in Boise, Idaho.

Zone 2: Fifty five (55) to one hundred (100) miles from City Hall in Boise, Idaho.

Zone 3: Over one hundred (100) miles from City Hall in Boise, Idaho.

There shall be a maximum of ten (10) hours of zone pay per workday.

**PLUMBER/PIPEFITTER/STEAMFITTER** (continued)

Area 2 **49.24** **28.79**

Reference Counties Area 2

Grant	Umatilla	Wallowa
Morrow	Union	

Zone Differential for Area 2  
(Add to Base Rate)

Zone 2 **10.62/hr.** not to exceed \$80.00 day.

Zone mileage based on road miles:

Zone 2: Eighty (80) miles or more from City Hall in Pasco, Washington.

(Add \$1.00 to base rate if it is possible for worker to fall 35 ft. or more, or if required to wear a fresh-air mask or similar equipment for 1 hour minimum increments)

Area 3 **42.83** **27.02**

Reference Counties Area 3

Benton	Deschutes	Klamath	Polk
Clackamas	Douglas	Lake	Sherman
Clatsop	Gilliam	Lane	Tillamook
Columbia	Hood River	Lincoln	Wasco
Coos	Jackson	Linn	Washington
Crook	Jefferson	Marion	Wheeler
Curry	Josephine	Multnomah	Yamhill

**POWER EQUIPMENT OPERATOR**

Zone 1 (Base Rate)

Group 1	<b>39.90</b>	<b>14.10</b>
Group 1A	<b>41.90</b>	<b>14.10</b>
Group 1B	<b>43.89</b>	<b>14.10</b>
Group 2	<b>37.99</b>	<b>14.10</b>
Group 3	<b>36.84</b>	<b>14.10</b>
Group 4	<b>35.76</b>	<b>14.10</b>
Group 5	<b>34.52</b>	<b>14.10</b>
Group 6	<b>31.30</b>	<b>14.10</b>

(Group 4 Tunnel Boring Machine Mechanic add \$10.00/hour hyperbaric pay)

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**POWER EQUIPMENT OPERATOR** (continued)

**Note:** A Hazardous Waste Removal Differential must be added to the base rate if work is performed inside the boundary of a Federally Designated Waste Site. For information on this differential, call the Prevailing Wage Rate Coordinator at (971) 673-0839.

(Add \$0.40 to the base rate for any and all work performed underground, including operating, servicing and repairing of equipment)

(Add \$0.50 to the base rate per hour for any employee who works suspended by a rope or cable)

(Add \$0.50 to the base rate for employees who do "pioneer" work (break open a cut, build road, etc.) more than one hundred fifty (150) feet above grade elevation)

Shift Differential

Two-Shift Operations:

On a two shift operation, when the second shift starts after 4:30 p.m., second-shift workers shall be paid the base hourly wage rate plus 5% for all hours worked.

When the second shift starts at 8:00 p.m. or later, the second-shift workers shall be paid at the base hourly wage rate plus 10% for all hours worked.

Three-Shift Operations:

On a three-shift operation, the base hourly wage rate plus five percent (5%) shall be paid to all second-shift workers for all hours worked, and the base hourly wage rate plus ten percent (10%) shall be paid to all third shift workers for all hours worked.

Zone Pay Differential for Power Equipment Operator  
(Add to Zone 1 Base Rate)

Zone 2	<b>3.00</b> per hour
Zone 3	<b>6.00</b> per hour

**For projects in the following metropolitan counties:**

Clackamas	Marion	Washington
Columbia	Multnomah	Yamhill

**See map on page 51 for Zone 1 of this classification**

**POWER EQUIPMENT OPERATOR** (continued)

(A) All jobs or projects located in Multnomah, Clackamas and Marion counties, West of the western boundary of Mt. Hood National Forest and West of Mile Post 30 on Interstate 84 and West of Mile Post 30 on State Hwy 26 and West of Mile Post 30 on Hwy 22 and all jobs located in Yamhill County, Washington County and Columbia County shall receive Zone 1 pay for all classifications.

(B) All jobs or projects located in the area outside the *identified boundary* above, but less than 50 miles from the Portland City Hall shall receive Zone 2 pay for all classifications.

(C) All jobs or projects located more than 50 miles from the Portland City Hall, but outside the identified border above, shall receive Zone 3 pay for all classifications.

**Reference cities for projects in all remaining counties:**

Albany	Coos Bay	Grants Pass	Medford
Bend	Eugene	Klamath Falls	Roseburg

(A) All jobs or projects located within 30 miles of the respective city hall of the above mentioned cities shall receive Zone 1 pay for all classifications.

(B) All jobs or projects located more than 30 miles and less than 50 miles from the respective city hall of the above mentioned cities shall receive Zone 2 for all classifications.

(C) All jobs or projects located more than 50 miles from the respective city hall of the above mentioned cities shall receive Zone 3 pay for all classifications.

**Note:** All job or project locations shall be computed (determined) on the basis of road miles and in the following manner. A mileage measurement will start at the entrance to the respective city hall, facing the project (if possible), and shall proceed by the normal route (shortest time-best road) to the geographical center on the highway, railroad, and street construction projects (end of measurement). On all other project contracts, the geographical center where the major portion of the construction is located, shall be considered the center of the project (end measurement).

**OREGON DETERMINATION 2017-02**

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**ROOFER**

Area 1

Roofer	<b>30.88</b>	<b>17.44</b>
Handling coal tar pitch	<b>33.97</b>	<b>17.44</b>
Remove fiberglass insulation	<b>33.97</b>	<b>17.44</b>

Reference Counties Area 1

Baker	Gilliam	Multnomah	Washington
Clackamas	Grant	Sherman	Wheeler
Clatsop	Hood River	Tillamook	
Columbia	Jefferson	Wasco	

Area 2

Roofer	<b>26.55</b>	<b>15.96</b>
Handling coal tar pitch	<b>28.55</b>	<b>15.96</b>
Remove fiberglass insulation	<b>28.05</b>	<b>15.96</b>

Reference Counties Area 2

Benton	Douglas	Lake	Marion
Coos	Harney	Lane	Polk
Crook	Jackson	Lincoln	Yamhill
Curry	Josephine	Linn	
Deschutes	Klamath	Malheur	

Area 4

Roofers	<b>26.86</b>	<b>11.73</b>
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Reference Counties Area 4

Umatilla	Union	Wallowa
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(Add \$2.00 to basic hourly rate for employees working with irritable bituminous materials)

(Add \$2.00 to basic hourly rate for employees removing fiberglass insulation)

Area 5

Roofers	<b>26.72</b>	<b>11.78</b>
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Reference County for Area 5

Morrow
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(Add \$3.00 to base rate for employees working with irritable and pitch bituminous materials)

**SHEET METAL WORKER**

Area 1

<b>38.77</b>	<b>20.43</b>
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Reference Counties Area 1

Benton	Grant	Multnomah	Washington
Clackamas	Hood River	Polk	Wheeler
Clatsop	Lincoln	Sherman	Yamhill
Columbia	Linn	Tillamook	
Gilliam	Marion	Wasco	

(Add \$1.00 to base rate for work performed on any swinging platform, swinging chair or swinging ladder)

(Add \$1.00 to base rate for work where a worker is exposed to resins, chemicals or acid)

Area 2

<b>25.00</b>	<b>18.21</b>
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Reference Counties Area 2

Baker	Malheur
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(Add \$1.75 to base rate for work performed in an area where epoxy resins or other injurious chemicals are being applied)

Area 3

<b>34.75</b>	<b>20.82</b>
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Reference Counties Area 3

Morrow	Umatilla	Union	Wallowa
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(Add \$1.00 to base rate for work where it is necessary to wear a chemically activated type face mask)

Area 4

<b>32.10</b>	<b>18.45</b>
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Reference Counties Area 4

Douglas	Lane
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(Add \$1.00 to base rate for work performed on any swinging platform, swinging chair or swinging ladder)

(Add \$1.00 to base rate for work where a worker is exposed to resins, chemicals or acid)

**TRADE**

**HOURLY  
BASE  
RATE**     **HOURLY  
FRINGE  
RATE**

**TRADE**

**HOURLY  
BASE  
RATE**     **HOURLY  
FRINGE  
RATE**

**SHEET METAL WORKER** (continued)

Area 5                                     **32.39**     **19.30**

Reference Counties Area 5

Coos

(Add \$1.00 to base rate for work performed on any swinging platform, swinging chair or swinging ladder)

(Add \$1.00 to base rate for work where a worker is exposed to resins, chemicals or acid)

Area 6                                     **27.30**     **17.54**

Reference Counties Area 6

Curry                     Jackson                     Klamath  
Harney                     Josephine                     Lake

(Add \$1.00 to base rate for work performed on any swinging platform, swinging chair or swinging ladder)

(Add \$1.00 to base rate for work where a worker is exposed to resins, chemicals or acid)

Area 7                                     **29.96**     **17.15**

Reference Counties Area 7

Crook                     Deschutes                     Jefferson

(Add \$1.00 to base rate for work performed on any swinging platform, swinging chair or swinging ladder)

(Add \$1.00 to base rate for work where a worker is exposed to resins, chemicals or acid)

**SOFT FLOOR LAYER**                     **27.61**     **16.73**

**SPRINKLER FITTER**

Area 1                                     **37.66**     **21.47**

Reference Counties Area 1

Benton	Deschutes	Klamath	Polk
Clackamas	Douglas	Lake	Sherman
Clatsop	Harney	Lane	Tillamook
Columbia	Hood River	Lincoln	Wasco
Coos	Jackson	Linn	Washington
Crook	Jefferson	Marion	Wheeler
Curry	Josephine	Multnomah	Yamhill

**SPRINKLER FITTER** (continued)

Area 2                                     **32.75**     **21.37**

Reference Counties Area 2

Baker	Grant	Morrow	Union
Gilliam	Malheur	Umatilla	Wallowa

**TENDERS TO MASON TRADES (Brick and Stonemason, Mortar Mixer, Hod Carrier)**

**30.89**     **13.85**

(Add \$0.50 to base rate for Refractory work)

**TENDER TO PLASTERER AND STUCCO MASON**

Zone A (Base Rate)  
**30.81**     **14.04**

Zone Differential for Tender to Plasterer  
and Stucco Mason  
(Add to Zone A Base Rate)

Zone B	<b>.85</b> per hour
Zone C	<b>1.25</b> per hour
Zone D	<b>1.70</b> per hour
Zone E	<b>2.00</b> per hour
Zone F	<b>3.00</b> per hour
Zone G	<b>5.00</b> per hour

Zone A: Projects located within 30 miles of city hall in the reference cities listed.

Zone B: More than 30 miles but less than 40 miles.

Zone C: More than 40 miles but less than 50 miles.

Zone D: More than 50 miles but less than 60 miles.

Zone E: More than 60 miles but less than 70 miles.

Zone F: More than 70 miles but less than 100 miles.

Zone G: More than 100 miles.

Reference Cities

Astoria	Coos Bay	Medford	Roseburg
Bend	Eugene	Pendleton	Salem
Corvallis	Klamath Falls	Portland	The Dalles

(Add \$0.50 to base rate for Refractory work)

<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>	<b>TRADE</b>	<b>HOURLY BASE RATE</b>	<b>HOURLY FRINGE RATE</b>
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**TESTING AND BALANCING (TAB) TECHNICIAN**

Air-Handling Equipment, Ductwork

See **SHEET METAL WORKER**

Water Distribution Systems

See **PLUMBER/PIPEFITTER/STEAMFITTER**

**TILESETTER/TERRAZZO WORKER: Hard Tilesetter**

**31.39    18.08**

(This trade is tended by "Tile, Terrazzo, & Marble Finisher")

(Add \$1.00 to base rate when working with a safety belt)

(Add \$1.00 to base rate if work involves epoxy, furnane, alkor or acetylene black grouting)

**TILE, TERRAZZO, AND MARBLE FINISHER**

1. TILE, TERRAZZO FINISHER

**23.95    13.18**

(Add \$1.00 to base rate when working with a safety belt)

(Add \$1.00 to base rate if work involves epoxy, furnane, alkor or acetylene black grouting)

2. BRICK AND MARBLE FINISHER

**23.95    13.31**

(Add \$1.00 to base rate for Refractory work)

**TRUCK DRIVER**

Zone A (Base Rate)

Group 1	<b>27.60</b>	<b>14.37</b>
Group 2	<b>27.72</b>	<b>14.37</b>
Group 3	<b>27.85</b>	<b>14.37</b>
Group 4	<b>28.12</b>	<b>14.37</b>
Group 5	<b>28.34</b>	<b>14.37</b>
Group 6	<b>28.51</b>	<b>14.37</b>
Group 7	<b>28.71</b>	<b>14.37</b>

**TRUCK DRIVER** (continued)

Zone differential for Truck Drivers  
(Add to Zone A Base Rate)

Zone B	<b>.65</b> per hour
Zone C	<b>1.15</b> per hour
Zone D	<b>1.70</b> per hour
Zone E	<b>2.75</b> per hour

Zone A: Projects within 30 miles of the cities listed.  
 Zone B: More than 30 miles but less than 40 miles.  
 Zone C: More than 40 miles but less than 50 miles.  
 Zone D: More than 50 miles but less than 80 miles.  
 Zone E: More than 80 miles.

Reference Cities

Albany	Eugene	Madras	Reedsport
Astoria	Goldendale	Medford	Roseburg
Baker	Grants Pass	McMinnville	Salem
Bend	Hermiston	Newport	The Dalles
Bingen	Hood River	Ontario	Tillamook
Brookings	Klamath Falls	Oregon City	Vancouver
Burns	LaGrande	Pendleton	
Coos Bay	Lakeview	Portland	
Corvallis	Longview	Port Orford	

**Note:** All job or project locations shall be computed (determined) on the basis of road miles and in the following manner. A mileage measurement will start at the entrance to the respective city hall, facing the project (if possible), and shall proceed by the normal route (shortest time-best road) to the geographical center on the highway, railroad, and street construction projects (end of measurement). On all other project contracts, the geographical center where the major portion of the construction is located, shall be considered the center of the project (end measurement).

**LIST OF CONTRACTORS INELIGIBLE  
TO RECEIVE PUBLIC WORKS CONTRACTS  
PUBLICATION DATE: JUNE 15, 2017**

**To: All Oregon Contracting Agencies**

Pursuant to ORS 279C.860, contractors on this list are ineligible to receive public works contracts subject to the Prevailing Wage Rate Law. These contractors and subcontractors, as well as any firm, corporation, partnership or association in which the contractor or subcontractor has a financial interest are ineligible to receive public works contracts until removed from this list.

If you have questions regarding the list or for the most current information regarding persons ineligible to receive prevailing wage contracts, please contact the Prevailing Wage Rate Coordinator in Portland at (971) 673-0839.

	<b><u>CONTRACTOR NAME</u></b>	<b><u>DATE PLACED</u></b>	<b><u>REMOVAL DATE</u></b>
1.	<b>A D Traffic Control Services, LLC</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	August 24, 2015	August 23, 2018
2.	<b>A2Z Flagging LLC</b> 731 N Hayden Meadows Dr, #107 Portland, OR 97217	May 2, 2017	May 1, 2020
3.	<b>Affordable Safe and Professional Flagging, LLC</b> 305 NE 6 <sup>th</sup> Street Grants Pass, OR 97526	September 17, 2012	September 16, 2017
4.	<b>Armiger Acoustical &amp; Drywall, Inc.</b> 11096 N Umpqua Highway Roseburg, OR 97470	June 1, 2017	May 31, 2018
5.	<b>Michael Armiger aka Michael Tobbin Armiger</b> 11096 N Umpqua Highway Roseburg, OR 97470	June 1, 2017	May 31, 2018
6.	<b>ASAP Flagging &amp; Traffic Control, Inc.</b> 11681 Sumner Street, Suite A Portland, OR 97220	September 17, 2012	September 16, 2017
7.	<b>Beaver Flagging</b> 2239 Dakota Street Eugene, OR 97404	November 25, 2009	November 24, 2019
8.	<b>Christy C. Beaver</b> 2570 River Road Eugene, OR 97404	November 25, 2009	November 24, 2019
9.	<b>Kimberly Bell-Eddy</b> 8535 Woodard Ave SE Salem, OR 97317	January 12, 2016	January 11, 2023
10.	<b>Russ Brotnov</b> 22905 S Stormer Rd Estacada, OR 97023	January 5, 2017	January 4, 2020
11.	<b>BSD OR WA. LLC</b> 2951 NW Division St., Ste110 Gresham, OR 97030	February 11, 2016	February 10, 2019
12.	<b>Bill Butler</b> 4355 SE 10 <sup>th</sup> Drive Gresham, OR 97080	January 22, 2016	January 21, 2019



**LIST OF CONTRACTORS INELIGIBLE  
TO RECEIVE PUBLIC WORKS CONTRACTS  
PUBLICATION DATE: JUNE 15, 2017**

	<b><u>CONTRACTOR NAME</u></b>	<b><u>DATE PLACED</u></b>	<b><u>REMOVAL DATE</u></b>
13.	<b>Cameron Creations</b> <b>Steven Cameron</b> <b>Nancy Cameron</b> PO Box 2 Lowell, OR 97452	May 25, 2000	Not to be Removed
14.	<b>Angela Canell</b> 6020 NE 33 <sup>rd</sup> Circle Vancouver, WA 98661	May 2, 2017	May 1, 2020
15.	<b>Carpentry Plus, Inc.</b> P O Box 998 Boring, OR 97009-0998	January 5, 2017	January 4, 2020
16.	<b>Concrete Works, Inc.</b> 2425 Fischer Rd NE Salem, OR 97305	June 15, 2017	June 14, 2020
17.	<b>Timothy Covington</b> 1000 NE 122 <sup>nd</sup> Street, Suite B-13 Portland, OR 97230	September 17, 2012	September 16, 2017
18.	<b>Kelly Cunningham</b> 4355 SE 120 <sup>th</sup> Drive Gresham, OR 97080	January 22, 2016	January 21, 2019
19.	<b>Randall D. David</b> 35491 Laura Lane SE Albany, OR 97321	January 15, 2016	January 14, 2019
20.	<b>Demolition Contractors, Inc.</b> PO Box 4010 19650 SW Teton Ave Tualatin, OR 97062	February 15, 2016	February 15, 2018
21.	<b>Amanda Dawn Denton Olsen-Smith</b> PO Box 1058 Willamina, OR 97080	February 11, 2016	February 10, 2019
22.	<b>DNB Painting, Inc.</b> 35491 Laura Lane SE Albany, OR 97321	January 15, 2016	January 14, 2019
23.	<b>Robert Donily</b> 19650 SW Teton Ave Tualatin, OR 97062	February 15, 2016	February 15, 2018
24.	<b>Final Touch NW, Inc.</b> PO Box 169 2245 Crestview Drive West Linn, OR 97068	January 8, 2015	January 7, 2018
25.	<b>GNC Construction Services, LLC</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	July 21, 2015 July 21, 2018	July 20, 2018 July 20, 2021

**LIST OF CONTRACTORS INELIGIBLE  
TO RECEIVE PUBLIC WORKS CONTRACTS  
PUBLICATION DATE: JUNE 15, 2017**

	<b><u>CONTRACTOR NAME</u></b>	<b><u>DATE PLACED</u></b>	<b><u>REMOVAL DATE</u></b>
26.	<b>H. &amp; L. Corporation</b> 13711 NE Laurin Rd. Vancouver, WA 98662	January 30, 2015	January 29, 2018
27.	<b>Armond Harper</b> 4071 N Mississippi Ave., Apt. A Portland, OR 97227	May 30, 2017	May 29, 2020
28.	<b>Kim Bell Flagging, Inc.</b> 8535 Woodard Ave SE Salem, OR 97317	January 12, 2016	January 11, 2023
29.	<b>Peter G. Lupachev aka Peter Lupachov</b> 4536 SE Stark Street Portland, OR 97239	November 2, 2015	November 1, 2018
30.	<b>Mountain View Flagging, Inc.</b> 1122 NE 122 <sup>nd</sup> Ave Portland, OR 97230	September 26, 2016	September 25, 2019
31.	<b>Sang In Nam dba Cornerstone Janitorial Services</b> 130 NE Danbury Ave Hillsboro, OR 97124	September 20, 2016	Not to be Removed
32.	<b>Noland Enterprises, Inc.</b> 601 NW McDonald Road Prineville, OR 97754	June 6, 2016	June 5, 2019
33.	<b>Debbie Noland</b> 601 NW McDonald Road Prineville, OR 97754	June 6, 2016	June 5, 2019
34.	<b>James Noland</b> 601 NW McDonald Road Prineville, OR 97754	June 6, 2016	June 5, 2019
35.	<b>A.J. Olsen-Smith aka Alex James Olsen-Smith aka Alex J. Olsen</b> PO Box 1058 Willamina, OR 97080	February 11, 2016	February 10, 2019
36.	<b>Orcanco Commercial Construction, Inc.</b> 4355 SE 10 <sup>th</sup> Drive Gresham, OR 97080	January 22, 2016	January 21, 2019
37.	<b>Peter Construction, Inc. dba Peters Construction, Inc.</b> 4522 SW Water Ave., Suite 110 Portland, OR 97239	November 2, 2015	November 1, 2018
38.	<b>Phoenix Construction Group, Inc.</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	August 24, 2015 August 24, 2018	August 23, 2018 August 23, 2021

**LIST OF CONTRACTORS INELIGIBLE  
TO RECEIVE PUBLIC WORKS CONTRACTS  
PUBLICATION DATE: JUNE 15, 2017**

	<u>CONTRACTOR NAME</u>	<u>DATE PLACED</u>	<u>REMOVAL DATE</u>
39.	<b>Portland Flagging, LLC dba A D Traffic Control Services</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	August 24, 2015	August 23, 2018
40.	<b>Portland Safety Equipment, LLC</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	August 24, 2015 August 24, 2018	August 23, 2018 August 23, 2021
41.	<b>Bernadine Raiford</b> 424 NE Shaver Street Portland, OR 97212	September 26, 2016	September 25, 2019
42.	<b>Colleen Runyon</b> 13711 NE Laurin Rd. Vancouver, WA 98662	January 30, 2015	January 29, 2018
43.	<b>Edward Runyon</b> 13711 NE Laurin Rd. Vancouver, WA 98662	January 30, 2015	January 29, 2018
44.	<b>Avian Samuel</b> PO Box 169 2245 Crestview Drive West Linn, OR 97068	January 8, 2015	January 7, 2018
45.	<b>Terrence Samuel</b> PO Box 169 PO Box 249 Wilsonville, OR 97070 2245 Crestview Drive West Linn, OR 97068	January 21, 2015	January 20, 2018
46.	<b>SBG Construction Services LLC</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	August 24, 2015 August 24, 2018	August 23, 2018 August 23, 2021
47.	<b>Kenya Smith</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	July 21, 2015	July 20, 2018
48.	<b>Alan Tatom</b> 168 Clearwater Avenue NE Salem, OR 97301	July 10, 2015	July 9, 2025
49.	<b>Tri-Star Flagging, LLC</b> 309 S. McLoughlin Blvd. Oregon City, OR 97045	August 24, 2015	August 23, 2018
50.	<b>Phillip Walker</b> 580 Market Street NE Salem, OR 97301	July 10, 2015	July 9, 2025



**BUREAU OF LABOR AND INDUSTRIES, PREVAILING WAGE RATE UNIT**

**INSTRUCTIONS FOR COMPLETING THE PREVAILING WAGE RATE  
PAYROLL/CERTIFIED STATEMENT FORM (WH-38)**

The Payroll/Certified Statement form (WH-38) may be used by contractors for reporting their payroll as required by ORS 279C.845 on public works projects subject to the Prevailing Wage Rate (PWR) Law. Although this form has not been officially approved by the U.S. Department of Labor (US DOL), it is designed to meet the requirements of the federal Davis-Bacon Act. For projects associated with the U.S. Department of Housing and Urban Development (HUD), contact the public agency (owner) associated with the project for assistance with payroll reporting.

Contractors are not required to use the WH-38 form in reporting their payroll; however, the contractor must provide all of the information contained in the form, including the certified statement on page two. The certified statement must be signed by the contractor, certifying the accuracy of the information reported on the payroll, including representations pertaining to the provision of fringe benefits to employees by third parties, and must be submitted with each weekly payroll report. Detailed instructions concerning the preparation of the form follow:

Complete the top third of the form. Be sure to enter the date the contract was first advertised for bid. If you are not sure of this date, contact the public agency (owner) associated with the project. The "Payroll No." is a US DOL requirement and represents the number of weeks the contractor performed work on the project.

**Column 1 – NAME AND ADDRESS:** The employee's full name must be shown on each payroll submitted. The employee's address must also be shown on the first payroll submitted. The address need not be shown on subsequent payrolls submitted unless the address changes. The US DOL requires an employee identification number for each individual employee, on each payroll submitted. This number may be, but does not have to be, the last four digits of the employee's social security number.

**Column 2 – CLASSIFICATION:** For assistance in determining the correct classification, use the Bureau of Labor and Industries' (BOLI's) publication "Definitions of Covered Occupations for Public Works Contracts in Oregon." On the WH-38, list the classification that is most descriptive of the work actually performed by the employee. Give the group number for those classifications that include such information. Indicate which workers are apprentices, if any, and give their current percentage, classification, and group number when applicable. If an employee works in more than one classification, use the highest rate for all hours worked, or use separate line entries to show hours worked and hourly rates for each classification.

**Column 3 – DAY AND DATE:** Enter the day of the week (M, T, W, Th, F, S, and Sn) in the top row of boxes, and the corresponding date below.

**HOURS WORKED EACH DAY:** Enter the total number of straight time hours worked in the row marked "ST." Generally, hours worked over 8 in a day or work performed on Saturdays, Sundays, and legal holidays should be entered as overtime ("OT") hours worked. Contractors who have adopted and followed a written work schedule of four consecutive ten-hour days (Monday through Thursday or Tuesday through Friday) may enter hours worked over 10 in a day as overtime hours. For more information on overtime requirements, see the Contractor Responsibilities section of BOLI's publication, "*Prevailing Wage Rate Laws*."

Check the correct work schedule box to indicate the employee's weekly work schedule: 5/8 or 4/10. Enter the employee's regular hourly schedule for the week being reported next to the "Reg. Hrly. Schd: \_\_\_\_\_ to \_\_\_\_\_." For example: 7:00 a.m. to 4:30 p.m.

**Column 4 – TOTAL HOURS:** Enter separately the total number of straight time and overtime hours worked by the employee (in each classification, if applicable) on the PWR project during the week. The total number of straight time hours worked should be entered in the lower box ("ST"); the total number of overtime hours worked should be entered in the top box ("OT").

**Column 5 – HOURLY BASE RATE:** Enter the hourly base rate (plus zone pay, if any) and the hourly overtime rate (plus zone pay, if any) paid to the employee in the appropriate straight time and overtime boxes. (Payment of not less than one and one half times the base rate of pay, including zone pay but not including fringe benefits, is required to be paid for overtime hours pursuant to ORS 279C.540). Generally, use the appropriate prevailing wage rates in effect at the time the contract was first advertised for bid by the public agency. If this date is not known, or if the project was not advertised for bid, contact the public agency (owner) associated with the project for assistance with applicable rates.

**Column 6 – HOURLY FRINGE BENEFIT AMOUNT PAID AS WAGES TO THE EMPLOYEE:** Enter hourly fringe benefit amounts paid directly to the employee as wages. (For overtime hours worked, it is not necessary to pay time and one half for the fringe benefit portion of the prevailing wage rate.)

**Column 7 – GROSS AMOUNT EARNED:** Enter the gross amount earned for work on the PWR project during the week. If part of the employee's wages for the pay period were earned on projects other than the project described on the WH-38, or if the employee is paid less often than on a weekly basis, enter in column 7 first the gross amount earned on the PWR project for the week, then the total gross amount earned for the pay period. For example: \$567.84 / \$1,267.27.

**Column 8 – ITEMIZED DEDUCTIONS, FICA, FED, STATE, ETC.:** Enter deductions withheld from wages for the pay period. All deductions must be in accordance with the provisions of ORS 652.610 (and as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. Stat. 967, 76 Stat. 357; 40 U.S.C 276c) on projects subject to Davis-Bacon Act). For projects subject to the Davis-Bacon Act, itemize the deductions.

**Column 9 – NET WAGES PAID:** Enter the total amount of net wages actually paid to the employee for the pay period. This figure can be calculated by subtracting the total deductions reported in Column 8 from the gross amount of wages for the pay period reported in the bottom portion of Column 7.

**Column 10 – HOURLY FRINGE BENEFITS PAID TO BENEFITS PARTY, PLAN, FUND OR PROGRAM:** Enter the hourly amount of fringe benefits paid to each individually approved party, plan, fund, or program, for each employee. List these amounts separately on the lines provided. Any contractor who is making payments to approved parties, plans, funds or programs in amounts less than the required hourly fringe benefit is obligated to pay the difference directly to the employee as wages in lieu of fringe benefits, and to show that amount in Column 6 of this form. For information on how to calculate hourly fringe benefit credits, see Appendix A in the BOLI's publication, "Prevailing Wage Rate Laws."

**Column 11 – NAME OF BENEFIT PARTY, PLAN, FUND OR PROGRAM:** Enter the name of the party, plan, fund, or program that corresponds to the amount paid as an hourly fringe benefit in Column 10.

#### **CALCULATION CHECK**

In order to determine whether the wages and fringe benefits paid are sufficient to meet prevailing wage rate requirements, the following check may be performed:

1. For each classification listed in column 2, compute the sum of:
  - a) the hourly base rate of pay shown in Column 5,
  - b) the hourly fringe benefit amount paid as wages to employee shown in Column 6, and
  - c) the hourly fringe benefits paid to benefit party, plan, fund or program shown in Column 10.
2. This sum must equal or exceed the total of the hourly base rate (including zone pay) and the hourly fringe benefit rate for that classification as listed in the appropriate issue of BOLI's publication, Prevailing Wage Rates for Public Works Contracts in Oregon.

IF YOU HAVE QUESTIONS REGARDING COMPLETION OF THIS FORM, CONTACT THE PREVAILING WAGE RATE UNIT OF THE BUREAU OF LABOR AND INDUSTRIES AT (971) 673-0838.

**NOTE: PAYROLL/CERTIFIED STATEMENTS ARE ONLY REQUIRED TO BE SUBMITTED TO THE PUBLIC AGENCY ASSOCIATED WITH THE PROJECT.**

**CERTIFIED PAYROLL AND OTHER FORMS ARE AVAILABLE ON OUR WEBSITE:  
[WWW.OREGON.GOV/BOLI](http://WWW.OREGON.GOV/BOLI)**

PRIME CONTRACTOR

SUBCONTRACTOR

PAYROLL NO. \_\_\_\_\_

FINAL PAYROLL

Business Name (DBA): \_\_\_\_\_ Phone: ( ) \_\_\_\_\_ CCB Registration Number: \_\_\_\_\_

Project Name: \_\_\_\_\_ Project Number: \_\_\_\_\_ Type of Work: \_\_\_\_\_

Street Address: \_\_\_\_\_ Project Location: \_\_\_\_\_

Mailing Address: \_\_\_\_\_ Project County: \_\_\_\_\_

Date Pay Period Began: \_\_\_\_\_ Date Pay Period Ended: \_\_\_\_\_

<b>THIS SECTION FOR PRIME CONTRACTORS ONLY</b>	<b>THIS SECTION FOR SUBCONTRACTORS ONLY</b>
Public Contracting Agency Name: Phone: ( ) Date Contract Specifications First Advertised for Bid: Contract Amount:	Subcontract Amount: Prime Contractor Business Name (DBA): Prime Contractor Phone: ( ) Prime Contractor's CCB Registration Number: Date You Began Work on the Project:

(1)	(2)	(3) DAY AND DATE							(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
NAME , ADDRESS AND EMPLOYEE'S IDENTIFICATION NUMBER	CLASSIFICATION (INCLUDE GROUP # AND APPRENTICESHIP STEP IF APPLICABLE)	HOURS WORKED EACH DAY							TOTAL HOURS	HOURLY BASE RATE	HOURLY FRINGE BENEFIT AMOUNTS PAID AS WAGES TO EMPLOYEE	GROSS AMOUNT EARNED (see directions)	ITEMIZED DEDUCTIONS FICA, FED, STATE, ETC.	NET WAGES PAID	HOURLY FRINGE BENEFITS PAID TO BENEFIT PARTY, PLAN, FUND, OR PROGRAM	NAME OF BENEFIT PARTY, PLAN, FUND, OR PROGRAM	
		OT										/					
		ST															
		Schedule: 5/8 <input type="checkbox"/> 4/10 <input type="checkbox"/> ; Reg. Hrly. Schd: _____ to _____.															
		OT										/					
		ST															
		Schedule: 5/8 <input type="checkbox"/> 4/10 <input type="checkbox"/> ; Reg. Hrly. Schd: _____ to _____.															
		OT										/					
		ST															
		Schedule: 5/8 <input type="checkbox"/> 4/10 <input type="checkbox"/> ; Reg. Hrly. Schd: _____ to _____.															
		OT										/					
		ST															
		Schedule: 5/8 <input type="checkbox"/> 4/10 <input type="checkbox"/> ; Reg. Hrly. Schd: _____ to _____.															

\*Although this form has not been officially approved by the U.S. Department of Labor, it is designed to meet the requirements of both the state PWR law and the federal Davis-Bacon Act.

**CERTIFIED STATEMENT**

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

I, \_\_\_\_\_,  
 (NAME OF SIGNATORY PARTY) (TITLE)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by:

\_\_\_\_\_ (CONTRACTOR, SUBCONTRACTOR OR SURETY)

on the \_\_\_\_\_; that during the payroll period

(BUILDING OR WORK) commencing on the \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, and ending the \_\_\_\_ day (MONTH) (YEAR)

of \_\_\_\_\_, \_\_\_\_\_, all persons employed on said project have been paid the (MONTH) (YEAR)

full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said \_\_\_\_\_

(CONTRACTOR, SUBCONTRACTOR OR SURETY) from the full weekly wages earned by any person, and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as specified in ORS 652.610, and as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. 276c), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for workers contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each worker conform with work performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a state apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a state, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

I HAVE READ THIS CERTIFIED STATEMENT, KNOW THE CONTENTS THEREOF AND IT IS TRUE TO MY KNOWLEDGE:

\_\_\_\_\_ (NAME AND TITLE)

\_\_\_\_\_ (SIGNATURE AND DATE)

**In addition to completing sections (1) - (3), if your project is subject to the federal Davis-Bacon Act requirements, complete the following section as well:**

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS OR PROGRAMS

- In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

- Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in Section 4(c) below.

(c) EXCEPTIONS:

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

**FILE THIS FORM WITH THE PUBLIC AGENCY ASSOCIATED WITH THE PROJECT  
 NOTE TO CONTRACTORS: YOU MUST ATTACH COPIES OF THIS FORM TO EACH OF YOUR PAYROLL SUBMISSIONS ON THIS PROJECT.  
 INSTRUCTIONS AND ADDITIONAL FORMS ARE AVAILABLE ON OUR WEBSITE: WWW.OREGON.GOV/BOLI.**

# **EXISTING SITE REPORTS**

**Geotechnical Report by Materials Testing & Inspection  
December 11, 2017**





**REVISED  
GEOTECHNICAL ENGINEERING REPORT  
of  
Flex Building Site  
Arlington Mesa Industrial Park  
Airport Road  
Arlington, OR**

**Prepared for:**

**Port of Arlington  
PO Box 279  
Arlington, OR 97812**

**MTI File Number BI71044g**

**Mr. Peter Mitchell  
Port of Arlington  
PO Box 279  
Arlington, OR 97812  
541-454-2868**

**Re: Geotechnical Engineering Report - Revised  
Flex Building Site  
Arlington Mesa Industrial Park  
Airport Road  
Arlington, OR**

Dear Mr. Mitchell:

In compliance with your instructions, MTI has conducted a soils exploration and foundation evaluation for the above referenced development. Fieldwork for this investigation was conducted on 27 and 28 July 2017. Data have been analyzed to evaluate pertinent geotechnical conditions. Results of this investigation, together with our recommendations, are to be found in the following report. We have provided a PDF copy for your review and distribution.

Often, questions arise concerning soil conditions because of design and construction details that occur on a project. MTI would be pleased to continue our role as geotechnical engineers during project implementation. Additionally, MTI can provide materials testing and special inspection services during construction of this project. If you will advise us of the appropriate time to discuss these engineering services, we will meet with you at your convenience.

MTI appreciates this opportunity to be of service to you and looks forward to working with you in the future. If you have questions, please call (208) 376-4748.

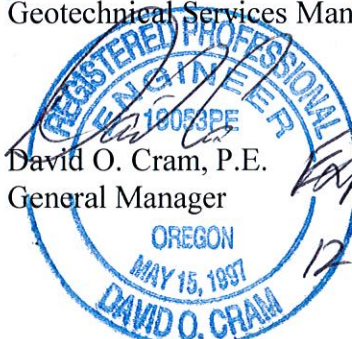
Respectfully Submitted,  
**Materials Testing & Inspection**



Clint Wyllie, G.I.T.  
Staff Geologist



Reviewed by: Elizabeth Brown, P.E.  
Geotechnical Services Manager



Reviewed by: David O. Cram, P.E.  
General Manager

Exp. 12-31-17

12-11-17

cc: Jeff Schott, Pillar Consulting Group (PDF Copy)

**TABLE OF CONTENTS**

INTRODUCTION .....4  
    Project Description .....4  
    Authorization .....4  
    Purpose .....4  
    Scope of Investigation .....4  
    Warranty and Limiting Conditions .....5  
SITE DESCRIPTION .....6  
    Site Access.....6  
    Regional Geology .....6  
    General Site Characteristics .....6  
    Regional Site Climatology and Geochemistry .....7  
SOILS EXPLORATION .....7  
    Exploration and Sampling Procedures .....7  
    Laboratory Testing Program .....7  
    Soil and Sediment Profile .....8  
    Volatile Organic Scan.....8  
SITE HYDROLOGY.....8  
    Groundwater .....8  
    Soil Infiltration Rates.....8  
    Infiltration Testing .....9  
SEISMIC SITE EVALUATION .....9  
    Geoseismic Setting .....9  
    Regional Faults .....10  
    Historical Seismicity.....10  
    Seismic Shaking .....10  
    Seismic Design Parameter Values .....10  
GEOLOGIC HAZARD ASSESSMENT .....12  
    Surface Fault Rupture .....12  
    Liquefaction.....12  
    Seismically Induced Landsliding .....13  
LATERAL EARTH PRESSURES.....13  
    Retaining Wall Backfill Materials .....14  
    Retaining Wall Drainage .....15  
FOUNDATION, SLAB, AND PAVEMENT DISCUSSION AND RECOMMENDATIONS .....15  
    Foundation Design Recommendations .....16  
    Floor Slab-on-Grade .....16  
    Recommended Pavement Sections .....17  
    Flexible Pavement Section .....17  
    Rigid Pavement Section.....18  
    Gravel Pavement Section.....19  
    Pavement Subgrade Preparation .....20  
    Common Pavement Section Construction Issues .....20  
CONSTRUCTION CONSIDERATIONS .....20  
    Earthwork .....21  
    Dry Weather .....21  
    Wet Weather.....21  
    Soft Subgrade Soils .....22  
    Frozen Subgrade Soils .....22  
    Structural Fill.....23  
    Backfill of Walls.....23



Excavations.....24

Groundwater Control.....24

GENERAL COMMENTS .....24

REFERENCES.....25

APPENDICES .....26

    Acronym List.....26

    Geotechnical General Notes .....27

    Geotechnical Investigation Test Pit Log.....28

    Geotechnical Investigation Hand Boring Log .....31

    AASHTO Pavement Thickness Design Procedures .....32

    AASHTO Rigid Pavement Thickness Design Procedures.....33

    AASHTO Gravel Pavement Thickness Design Procedures.....34

    Plate 1: Vicinity Map.....35

    Plate 2: Site Map.....36

## INTRODUCTION

This report presents results of a geotechnical investigation and analysis in support of data utilized in design of structures as defined in the 2012 International Building Code (IBC). Information in support of groundwater and stormwater issues pertinent to the practice of Civil Engineering is included. Observations and recommendations relevant to the earthwork phase of the project are also presented. Revisions in plans or drawings for the proposed structure from those enumerated in this report should be brought to the attention of the soils engineer to determine whether changes in the provided recommendations are required. Deviations from noted subsurface conditions, if encountered during construction, should also be brought to the attention of the soils engineer.

### Project Description

The proposed development is in the northeastern portion of the City of Arlington, Gilliam County, OR, and occupies a portion of the NE $\frac{1}{4}$ NW $\frac{1}{4}$  of Section 27, Township 3 North, Range 21 East, Willamette Meridian. This project will consist of construction of a 6,000 square-foot, pre-engineered metal building, to be developed on 1.5 acres. Total settlements are limited to 1 inch. Loads of up to 4,000 pounds per lineal foot for wall footings, and column loads of up to 30,000 pounds were assumed for settlement calculations. Additionally, traffic information was provided by Mr. Peter Mitchell of Port of Arlington for traffic loading of pavements. Retaining walls are not anticipated. MTI has not been informed of the proposed grading plan.

### Authorization

Authorization to perform this exploration and analysis was given in the form of a written authorization to proceed from Mr. Peter Mitchell of Port of Arlington to Clint Wyllie of Materials Testing and Inspection, Inc. (MTI), on 13 July 2017. Said authorization is subject to terms, conditions, and limitations described in the Professional Services Contract entered into between Port of Arlington and MTI. Our scope of services for the proposed development has been provided in our proposal dated 26 June 2017 and repeated below.

### Purpose

The purpose of this Geotechnical Engineering Report is to determine various soil profile components and their engineering characteristics for use by either design engineers or architects in:

- Preparing or verifying suitability of foundation design and placement
- Preparing site drainage designs
- Indicating issues pertaining to earthwork construction
- Preparing light duty gravel, asphalt, and concrete pavement section design requirements

### Scope of Investigation

The scope of this investigation included review of geologic literature and existing available geotechnical studies of the area, visual site reconnaissance of the immediate site, subsurface exploration of the site, field and laboratory testing of materials collected, and engineering analysis and evaluation of foundation materials.

## **Warranty and Limiting Conditions**

MTI warrants that findings and conclusions contained herein have been formulated in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology only for the site and project described in this report. These engineering methods have been developed to provide the client with information regarding apparent or potential engineering conditions relating to the site within the scope cited above and are necessarily limited to conditions observed at the time of the site visit and research. Field observations and research reported herein are considered sufficient in detail and scope to form a reasonable basis for the purposes cited above.

### **Limitations**

Test pits were limited to a maximum excavation depth of 9.6 feet bgs because of strong calcium carbonate cementation and equipment limitations.

### **Exclusive Use**

**This report was prepared for exclusive use of the property owner(s), at the time of the report, and their retained design consultants (“Client”).** Conclusions and recommendations presented in this report are based on the agreed-upon scope of work outlined in this report together with the Contract for Professional Services between the Client and Materials Testing and Inspection, Inc. (“Consultant”). Use or misuse of this report, or reliance upon findings hereof, by parties other than the Client is at their own risk. Neither Client nor Consultant make representation of warranty to such other parties as to accuracy or completeness of this report or suitability of its use by such other parties for purposes whatsoever, known or unknown, to Client or Consultant. Neither Client nor Consultant shall have liability to indemnify or hold harmless third parties for losses incurred by actual or purported use or misuse of this report. No other warranties are implied or expressed.

### **Report Recommendations are Limited and Subject to Misinterpretation**

There is a distinct possibility that conditions may exist that could not be identified within the scope of the investigation or that were not apparent during our site investigation. Findings of this report are limited to data collected from noted explorations advanced and do not account for unidentified fill zones, unsuitable soil types or conditions, and variability in soil moisture and groundwater conditions. To avoid possible misinterpretations of findings, conclusions, and implications of this report, MTI should be retained to explain the report contents to other design professionals as well as construction professionals.

Since actual subsurface conditions on the site can only be verified by earthwork, note that construction recommendations are based on general assumptions from selective observations and selective field exploratory sampling. Upon commencement of construction, such conditions may be identified that require corrective actions, and these required corrective actions may impact the project budget. Therefore, construction recommendations in this report should be considered preliminary, and MTI should be retained to observe actual subsurface conditions during earthwork construction activities to provide additional construction recommendations as needed.

Since geotechnical reports are subject to misinterpretation, **do not** separate the soil logs from the report. Rather, provide a copy of, or authorize for their use, the complete report to other design professionals or contractors. Locations of exploratory sites referenced within this report should be considered approximate locations only. For more accurate locations, services of a professional land surveyor are recommended.

This report is also limited to information available at the time it was prepared. In the event additional information is provided to MTI following publication of our report, it will be forwarded to the client for evaluation in the form received.

### **Environmental Concerns**

Comments in this report concerning either onsite conditions or observations, including soil appearances and odors, are provided as general information. These comments are not intended to describe, quantify, or evaluate environmental concerns or situations. Since personnel, skills, procedures, standards, and equipment differ, a geotechnical investigation report is not intended to substitute for a geoenvironmental investigation or a Phase II/III Environmental Site Assessment. If environmental services are needed, MTI can provide, via a separate contract, those personnel who are trained to investigate and delineate soil and water contamination.

## **SITE DESCRIPTION**

### **Site Access**

Access to the site may be gained via Highway 19 (John Day Highway) to Rhea Road. Proceed east and northeast on Rhea Road approximately 1.25 miles to its intersection with Airport Road. The site is located roughly 1.3 miles northwest of this intersection, on the south side of Airport Road. Presently the site exists as bare land. The location is depicted on site map plates included in the **Appendix**.

### **Regional Geology**

The project site is located within the western portion of the Hurlburt Flats Plateau in north-central Oregon. The plateau is underlain by volcanic flood basalts mantled with alluvial sediments and Missoula Flood deposits. The volcanic flood basalts are part of the Columbia River Basalt Group (CRBG) which consists of a series of Miocene age (17 to 6 million year ago) basalt flows that cover northern and eastern Oregon, central and eastern Washington, and western Idaho. Over 300 individual flows have been identified as part of the CRBG with flows ranging in thickness from 5 feet to over 100 feet. Total thickness of the series of flows may be as great as 10,000 ft. Surficial soils consist of varying mixtures of silts, sands, and gravels deposited in a variety of geologic environments.

### **General Site Characteristics**

This proposed development consists of approximately 1.5 acres of gently sloping terrain. The surface slopes downwards to the south with approximately 7 feet of relief across the site. Throughout the majority of the site, surficial soils consist of sandy, silty clays. Vegetation primarily consists of sagebrush, bunchgrass, and other native grass varieties typical of arid to semi-arid environments.

Regional drainage is north and west toward the Columbia River. Stormwater drainage for the site is achieved by percolation through surficial soils. The site is situated so that it is unlikely that it will receive any stormwater drainage from off-site sources. Stormwater drainage collection and retention systems are not in place on the project site and were not noted within the vicinity of the project site.

### **Regional Site Climatology and Geochemistry**

According to the Western Regional Climate Center, the average precipitation for the Arlington Area is on the order of 8 to 9 inches per year, with an annual snowfall of approximately 10 inches a. The monthly mean daily temperatures range from 30°F to 91°F. Soils and sediments in the area are primarily derived from siliceous materials and exhibit low electro-chemical potential for corrosion of metals or concretes. Local aggregates are generally appropriate for Portland cement and lime cement mixtures. Surface water, groundwater, and soils in the region typically have pH levels ranging from 7.2 to 8.2.

## **SOILS EXPLORATION**

### **Exploration and Sampling Procedures**

Field exploration conducted to determine engineering characteristics of subsurface materials included a reconnaissance of the project site and investigation by test pit and hand boring. Test pit/hand boring sites were located in the field by means of a Global Positioning System (GPS) device and are reportedly accurate to within ten feet. Upon completion of investigation, each test pit/hand boring was backfilled with loose excavated materials. Re-excavation and compaction of the test pit areas are required prior to construction of overlying structures.

In addition, samples were obtained from representative soil strata encountered. Samples obtained have been visually classified in the field by professional staff, identified according to test pit/hand boring number and depth, placed in sealed containers, and transported to our laboratory for additional testing. Subsurface materials have been described in detail on logs provided in the **Appendix**. Results of field and laboratory tests are also presented in the **Appendix**. MTI recommends that these logs **not** be used to estimate fill material quantities.

### **Laboratory Testing Program**

Along with our field investigation, a supplemental laboratory testing program was conducted to determine additional pertinent engineering characteristics of subsurface materials necessary in an analysis of anticipated behavior of the proposed structures. Laboratory tests were conducted in accordance with current applicable American Society for Testing and Materials (ASTM) specifications, and results of these tests are to be found on the accompanying logs located in the **Appendix**. The laboratory testing program for this report included: Atterberg Limits Testing – ASTM D4318 and Grain Size Analysis – ASTM C117/C136.



## Soil and Sediment Profile

The profile below represents a generalized interpretation for the project site. Note that on site soils strata, encountered between test pit/hand boring locations, may vary from the individual soil profiles presented in the logs, which can be found in the **Appendix**.

Sandy silt fill materials were observed at ground surface in test pit 1. These materials were light brown to whitish, dry, and very stiff to hard, with fine-grained sand. Sandy, silty clay soils were encountered beneath fill materials in test pit 1 and at ground surface in the remaining test pits/hand boring. These soils were brown or red-brown to whitish, dry, and very stiff to hard, with fine-grained sand. Weak to strong calcic cementation was encountered within this horizon at depths ranging from 4.5 to 9.6 feet bgs.

Test pit/hand boring sidewalls were generally stable. However, moisture contents will affect wall competency with saturated soils having a tendency to readily slough when under load and unsupported.

## Volatile Organic Scan

No environmental concerns were identified prior to commencement of the investigation. Therefore, soils obtained during on-site activities were not assessed for volatile organic compounds by portable photoionization detector. Samples obtained during our exploration activities exhibited no odors or discoloration typically associated with this type of contamination. No groundwater was encountered.

## SITE HYDROLOGY

Existing surface drainage conditions are defined in the **General Site Characteristics** section. Information provided in this section is limited to observations made at the time of the investigation. Either regional or local ordinances may require information beyond the scope of this report.

### Groundwater

During this field investigation, groundwater was not encountered in test pits/hand boring advanced to a maximum depth of 9.6 feet bgs. Soil moistures in the test pits/hand boring were generally dry to slightly moist throughout. In the vicinity of the project site, groundwater levels are controlled in large part by agricultural and commercial irrigation activity. Based on evidence of this investigation and background knowledge of the area, specifically the site's topography and elevation above the Columbia River, MTI estimates groundwater depths to remain greater than approximately 15 feet bgs throughout the year. This depth can be confirmed through long-term groundwater monitoring.

### Soil Infiltration Rates

Soil permeability, which is a measure of the ability of a soil to transmit a fluid, was tested in the field. For this report, an estimation of infiltration is also presented using generally recognized values for each soil type and gradation. Of soils comprising the generalized soil profile for this study, sandy, silty clay soils will commonly exhibit infiltration rates from 1 to 4 inches per hour; though calcium carbonate cementation may reduce this value to near zero.

## Infiltration Testing

Infiltration testing was conducted on non-cemented sandy, silty clay soils at a depth of 3.0 feet bgs in hand boring 1. The test was conducted using a 4-inch diameter PVC pipe installed in the sandy, silty clay soils. The test apparatus was filled with approximately 10 gallons of water on 27 July 2017 and allowed to pre-soak for 24 hours prior to testing. Pre-soaking increases soil moistures, which allows the tested soils to reach a saturated condition more readily during testing. Saturation of the tested soils is desirable in order to isolate the vertical component of infiltration by inhibiting horizontal seepage during testing.

The test procedure consisted of adding 12 inches of water to the apparatus followed by monitoring of water level decline for 1 hour or until the water was completely drained. During testing on 28 July 2017, the rate of water level decline within the test apparatus was monitored for 4 successive intervals. For safety considerations, soils surrounding the test apparatus were completely replaced to original surface elevation. The results of the infiltration testing are as follows:

### Infiltration Testing Results

Test Location	Test Interval	Infiltration Time (minutes)	Observed Infiltration ( inches)	Infiltration Rate (inches/hour)
Hand Boring 1 – 3.0 Feet bgs	1	60	4.20	4.20
	2	60	4.08	4.08
	3	60	3.84	3.84
	4	60	3.84	3.84

These data suggest that the native, non-cemented, sandy, silty clays present at depth of 3.0 feet below existing grade in hand boring 1 had a stabilized infiltration rate of 3.84 inches per hour. MTI recommends that a safety factor of 2 be applied to the design infiltration rate. The reason for the decreased infiltration rate is to account for long term saturation of the soils and the potential for less permeable soils to settle into the bottom of the infiltration facilities.

## SEISMIC SITE EVALUATION

### Geoseismic Setting

Soils on site are classed as Site Class D in accordance with Chapter 20 of the American Society of Civil Engineers (ASCE) publication ASCE/SEI 7-10. Structures constructed on this site should be designed per IBC requirements for such a seismic classification. Our investigation did not reveal hazards resulting from potential earthquake motions including: slope instability, liquefaction, and surface rupture caused by faulting or lateral spreading. Incidence and anticipated acceleration of seismic activity in the area is low.

## Regional Faults

The site is situated within the Umatilla Basin of the Columbia Plateau. According to geologic maps, the Arlington-Shutler Butte Fault is located approximately 4 miles to the west of the project site. According to a USGS Interactive Fault Map, the Arlington-Shutler Butte Fault was most recently active in the middle and late Quaternary Period (less than 750,000 years ago), and has a slip rate of less than 0.2 millimeter per year.

## Historical Seismicity

According to the USGS Earthquake Hazards Program (<https://earthquake.usgs.gov/earthquakes/>), there have been 59 recorded earthquakes within approximately 25 miles of the project site, with magnitudes ranging from 2.6 to 3.6 on the Mercalli Magnitude Scale.

## Seismic Shaking

The USGS Geologic Hazards Science Center Hazard Curve Application was used to obtain values for ground motion at the project site (<http://geohazards.usgs.gov/hazardtool/>). The USGS program indicates a peak ground acceleration of 0.1223g (i.e., 12.23 percent of gravitational acceleration) for a probability of exceedance of 10% in 50 years and 0.2833 for a probability of exceedance of 2% in 50 years at the location of the project site (45.719498, -120.177143) using a site class D.

	<b>10% PE in 50 Years</b>	<b>2% PE in 50 Years</b>
<b>PGA</b>	12.23	28.33
<b>0.2 sec SA</b>	30.38	69.00
<b>1.0 sec SA</b>	14.61	32.97

## Seismic Design Parameter Values

The United States Geological Survey National Seismic Hazard Maps (2008), includes a peak ground acceleration map. The map for 2% probability of exceedance in 50 years in the Western United States in standard gravity (g) indicates that a probability of 0.16 is appropriate for the project site.

The following section provides an assessment of the earthquake-induced earthquake loads for the site, including identification of the earthquake spectral response acceleration for short periods,  $S_{MS}$ , and at 1-second period,  $S_{M1}$ , adjusted for site class effects as required by the 2012 IBC based on the following equations:

$$S_{MS} = F_a S_s$$

$$S_{M1} = F_v S_1$$

Where:

$F_a$  = Site coefficient defined in Table 1613.3(1) in IBC.

$F_v$  = Site coefficient defined in Table 1613.3(1) in IBC

$S_s$  = The mapped spectral accelerations for short periods.

$S_1$  = The mapped spectral accelerations for 1-second periods.

The USGS National Seismic Hazards Mapping Project includes a program that provides values for ground motion at a selected site based on the same data that were used to prepare the USGS ground motion maps. The maps were developed using attenuation relationships for soft rock sites; the source model, assumptions, and empirical relationships used in preparation of the maps are described in Petersen and others (1996). The following values are based on a site specific Site Class of D.

$S_s$  and  $S_1$  = Mapped Spectral Acceleration Values

Site Class D

$F_a$  = 1.44

$F_v$  = 2.09

Period (sec)	$S_a$ (g)
0.2	0.445 ( $S_s$ , Site Class D)
1.0	0.178 ( $S_1$ , Site Class D)

$$S_{MS} = 0.634$$

$$S_{M1} = 0.372$$

Design spectral response acceleration parameters as presented in the 2012 IBC are defined as a 5% damped design spectral response acceleration at short periods,  $S_{DS}$ , and at 1-second period,  $S_{D1}$ , as calculated from the following equations:

$$S_{DS} = \frac{2}{3} S_{MS}$$

$$S_{D1} = \frac{2}{3} S_{M1}$$

For the proposed project site, the 5% damped design spectral response acceleration at short periods, as calculated using the program supplied by the USGS are as follows:

$$S_{DS} = 0.423$$

$$S_{D1} = 0.248$$

## GEOLOGIC HAZARD ASSESSMENT

This section provides an assessment of the geologic hazards for the site, including the potential for surface fault rupture, liquefaction, seismically induced settlements, seismically induced landsliding, lateral spreading, flooding, collapsible soils, and the presence of solution cavities. Inundation due to tsunamis, seiche, or seismically induced failure of water-retention facilities was considered; however, there are no features that would pose a hazard of this nature in close proximity to the site. Therefore, there is no further discussion of these specific hazards.

The hazard evaluation methodology involves one or two steps. First, the potential for occurrence of each type of geologic phenomenon is assessed. If there is a potential for a phenomenon to occur, the second step is to assess whether the phenomenon likely will result in a significant hazard for designated structures. For this evaluation, a significant hazard is defined as one that results in structural damage and threatens life-safety.

### Surface Fault Rupture

Earthquakes generally are caused by a sudden slip or displacement along a zone of weakness, termed a fault, in the Earth's crust. Surface fault rupture, which is a manifestation of the fault displacement at the ground surface, usually is associated with moderate to large-magnitude earthquakes (magnitudes of about 6 or larger) occurring on active faults having mapped traces or zones at the ground surface. The amount of surface fault displacement can be as much as 10 feet (3 meters) or more, depending on the earthquake magnitude and other factors. The displacements associated with surface fault rupture can have devastating effects on structures and lifelines situated astride the zone of rupture.

No evidence of potentially active faults are mapped within the immediate vicinity of the project site. Based on this information, we conclude that the potential for surface fault rupture is low.

### Liquefaction

Liquefaction is a soil behavior phenomenon in which a soil located below the groundwater surface loses a substantial amount of strength due to strong earthquake ground shaking. Some types of soil tend to compact during earthquake shaking, inducing excess pore water pressure in the saturated soil, which, in turn, causes a reduction in strength of the soil. Recently deposited (i.e., geologically young) and relatively loose natural soils, and uncompacted or poorly compacted fills, are potentially susceptible to liquefaction. Loose sands are particularly susceptible. Loose silts also have potential for liquefaction. Dense natural soils and well-compacted fills have low susceptibility to liquefaction. Clayey soils and bedrock generally are not susceptible to liquefaction.

Possible consequences of liquefaction include vertical settlement, lateral displacement, loss of bearing capacity for foundations supported by soil that liquefies, increased lateral loading on structures retaining soil that liquefies, and flotation of lightweight structures embedded in soil that liquefies.

The conditions on the site are potentially conducive to a liquefaction event, due to the soils encountered at the site. Based on this information and data from the Oregon Department of Geology and Mineral Industries Geohazards maps, we conclude that the potential for liquefaction at the site is low.

### **Seismically Induced Landsliding**

Earthquake ground shaking can reduce the stability of a slope and cause sliding or falling of the soil or rock materials composing the slope. During ground shaking, seismic inertia forces are induced within the slope, increasing the loads that the slope materials must sustain to resist landsliding (or rockfalls). If the forces tending to cause landsliding exceed the strength of the materials resisting landsliding, a temporary instability is created that is manifested by lateral or downslope displacement of the slope materials. In some cases, strong ground shaking can also reduce the strength of the soil or rock materials, reducing their ability to resist the forces that cause landsliding.

Possible consequences of landsliding include differential lateral and vertical movements of structures situated within the landslide zone, undermining of structures upslope of the landslide, burial or filling of facilities downslope of the landslide, increased loading against structures in the path of the landslide, and decreased stability of slopes above the landslide.

As discussed in the **General Site Characteristics** section, the site is on relatively flat and level ground. Based on this information, we conclude that the potential for seismically induced landslides at the site is very low.

## **LATERAL EARTH PRESSURES**

Retaining, below-grade, or basement walls will be subject to lateral earth pressures. The magnitude of earth pressure is a function of both type and compaction of backfill behind walls within the “active” zone, and allowable rotation of the top of the wall. The active zone is defined as the wedge of soil between the surface of the wall and a plane inclined 31 degrees from vertical passing through the base of the wall. The following recommendations should be used when dealing with lateral earth pressures on a gravity block: 1) a sliding frictional coefficient of 0.35 is appropriate considering native sandy, silty clay (CL-ML) soils, and 2) a sliding frictional coefficient of 0.45 is appropriate considering granular structural fill (SP/GP) under typical conditions.

A state of plastic equilibrium is when the subject material is considered to be 1) homogeneous and unbounded and 2) at the point of incipient instability. This state is evaluated on the basis of unit weight, mechanical properties, and the definition of instability. For the purpose of this report, it is assumed that imported granular fill material will be the materials of concern regarding lateral earth pressures. If other materials are considered for use, MTI must be contacted to provide alternate lateral earth pressure information. Furthermore, changes in natural soil moisture, such as can be imposed by site stormwater systems, can change the values listed below.

Below-grade restrained walls, such as basement walls, should be designed based on at-rest pressures. Active pressures are appropriate under conditions where the wall moves or rotates away from the soil mass at failure. Passive pressures are used for conditions where the wall moves toward the soil mass at failure. Rotation, or lateral movement, of the top of the wall equal to 0.002 times the height of the wall will be necessary for on-site soil backfill to achieve an “active” loading condition. Lateral movement of the top of the wall equal to 0.001 times the height of the wall will be necessary for the “active” pressure condition for imported SP/GP structural backfill.

### Retaining Wall Backfill Materials

For lateral earth pressure analysis, MTI anticipates that the soils of interest will be the native sandy, silty clay (CL-ML) soils encountered in the test pits. For CL-ML soils, the following values are applicable under non-surcharged, drained conditions.

#### Lateral Earth Pressure Values for Native Soil

Soil Type: Sandy, Silty Clay			
Internal Friction Angle:	28 °	Dry Unit Weight:	105 pcf
Cohesion:	200 psf	Buoyant Unit Weight:	68 pcf
Natural Void Ratio:	0.7	Natural Moisture:	16 %
At rest lateral earth pressure:	65 pcf <sup>1</sup>		K <sub>o</sub> = 0.5
Active lateral earth pressure:	44 pcf <sup>1</sup>		K <sub>a</sub> = 0.4
Passive lateral earth pressure:	337 pcf <sup>1</sup>		K <sub>p</sub> = 2.8

<sup>1</sup>Lateral earth pressure values are in pounds per square foot, per foot of wall (psf/ft). Alternately, the values presented may also be considered as equivalent fluid with units of pounds per cubic foot (pcf).

Imported, compacted, structural material, which is used to backfill the soil side of walls, must demonstrate the following characteristics:

#### Lateral Earth Pressure Values for Fill Materials

Soil Type: Compacted Sandy Gravel			
Internal Friction Angle:	35 °	Dry Unit Weight:	128 pcf
Cohesion:	NA	Buoyant Unit Weight:	83 pcf
Natural Void Ratio:	0.4	Natural Moisture:	5 %
At rest lateral earth pressure:	57 pcf <sup>1</sup>		K <sub>o</sub> = 0.4
Active lateral earth pressure:	36 pcf <sup>1</sup>		K <sub>a</sub> = 0.3
Passive lateral earth pressure:	496 pcf <sup>1</sup>		K <sub>p</sub> = 3.7

<sup>1</sup>Lateral earth pressure values are in pounds per square foot, per foot of wall (psf/ft). Alternately, the values presented may also be considered as equivalent fluid with units of pounds per cubic foot (pcf).

In the case that another material is used for backfill, MTI should be consulted for alternate lateral earth pressure values. Granular structural fill should consist of 4-inch-minus select, clean, granular soil with no more than 30 percent oversize (greater than ¾-inch) material and no more than 5 percent fines (passing the No. 200 sieve). Retaining wall and basement backfill must be placed in accordance with recommendations in the **Structural Fill** section of this report and must be properly compacted and tested.

Lateral earth pressure values do not incorporate specific factors of safety, and are only applicable for non-surcharged, drained conditions. Factors of safety, if applicable, should be integrated into the structural design of the wall. The preceding values are presented for idealized conditions relating to simple shallow structures. For complex structures, deep structures, or structures with significant perimeter landscaping, a soils engineer should be retained as part of the design team in developing appropriate project design parameters and construction specifications.

### **Retaining Wall Drainage**

MTI recommends that a drainage system be incorporated into the retained soil mass. This can be accomplished by installing wall and toe drains as a part of each soil-supporting wall system. In areas where there is potential for significantly high soil moistures within the supported soil mass, installation of drains within the soil mass is recommended. Particular consideration of roof drain effluent and irrigation water must be made. Further, these drainage systems must be separate from other retaining wall/foundation systems. If the granular structural fill option to reduce lateral pressures is used, a compacted low permeability soil cap is recommended within the upper 2 feet of the surface to limit surface water infiltration behind the walls.

## **FOUNDATION, SLAB, AND PAVEMENT DISCUSSION AND RECOMMENDATIONS**

Various foundation types have been considered for support of the proposed structure. Two requirements must be met in the design of foundations. First, the applied bearing stress must be less than the ultimate bearing capacity of foundation soils to maintain stability. Second, total and differential settlement must not exceed an amount that will produce an adverse behavior of the superstructure. Allowable settlement is usually exceeded before bearing capacity considerations become important; thus, allowable bearing pressure is normally controlled by settlement considerations.

Considering subsurface conditions and the proposed construction, it is recommended that the structure be founded upon conventional spread footings and continuous wall footings. Total settlements should not exceed 1 inch if the following design and construction recommendations are observed.



## Foundation Design Recommendations

Based on data obtained from the site and test results from various laboratory tests performed, MTI recommends the following guidelines for the net allowable soil bearing capacity:

### Soil Bearing Capacity

Footing Depth	ASTM D1557 Subgrade Compaction	Net Allowable Soil Bearing Capacity
Footings must bear on competent, undisturbed, native sandy, silty clay soils or compacted structural fill. Existing fill materials and organics must be completely removed from below foundation elements. <sup>1</sup> Excavation depths ranging from roughly 0.4 to 2.1 feet bgs should be anticipated to expose proper bearing soils. <sup>2</sup>	Not Required for Native Soil  95% for Structural Fill	1,500 lbs/ft <sup>2</sup>  A 1/3 increase is allowable for short-term loading, which is defined by seismic events or designed wind speeds.

<sup>1</sup>It will be required for MTI personnel to verify the bearing soil suitability for each structure at the time of construction.

<sup>2</sup>Depending on the time of year construction takes place, the subgrade soils may be unstable because of high moisture contents. If unstable conditions are encountered, over-excavation and replacement with granular structural fill and/or use of geotextiles may be required.

The following sliding frictional coefficient values should be used: 1) 0.35 for footings bearing on native sandy, silty clay (CL-ML) soils and 2) 0.45 for footings bearing on granular structural fill. A passive lateral earth pressure of 337 pounds per square foot per foot (psf/ft) should be used for sandy, silty clay (CL-ML) soils. For compacted sandy gravel fill, a passive lateral earth pressure of 496 psf/ft should be used.

Footings should be proportioned to meet either the stated soil bearing capacity or the 2012 IBC minimum requirements. Total settlement should be limited to approximately 1 inch, and differential settlement should be limited to approximately 1/2 inch. Objectionable soil types encountered at the bottom of footing excavations should be removed and replaced with structural fill. Excessively loose or soft areas that are encountered in the footings subgrade will require over-excavation and backfilling with structural fill. To minimize the effects of slight differential movement that may occur because of variations in the character of supporting soils and seasonal moisture content, MTI recommends continuous footings be suitably reinforced to make them as rigid as possible. For frost protection, the bottom of external footings should be 24 inches below finished grade.

## Floor Slab-on-Grade

Fill materials were encountered in portions of the site. MTI recommends that these fill materials be excavated to a sufficient depth to expose competent, native soils or to a minimum depth of 1 1/2 feet below finished subgrade. If fill materials remain after over-excavation, the exposed subgrade must be compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. MTI personnel must be present during excavation to identify these materials.

Organic, loose, or obviously compressive materials must be removed prior to placement of concrete floors or floor-supporting fill. In addition, the remaining subgrade should be treated in accordance with guidelines presented in the **Earthwork** section. Areas of excessive yielding should be excavated and backfilled with structural fill. Fill used to increase the elevation of the floor slab should meet requirements detailed in the **Structural Fill** section. Fill materials must be compacted to a minimum 95 percent of the maximum dry density as determined by ASTM D1557.

A free-draining granular mat (drainage fill course) should be provided below slabs-on-grade. This should be a minimum of 4 inches in thickness and properly compacted. The mat should consist of a sand and gravel mixture, complying with Oregon Department of Transportation (ODOT) Standard Specifications for Construction specifications for ¾-inch crushed aggregate. A moisture-retarder should be placed beneath floor slabs to minimize potential ground moisture effects on moisture-sensitive floor coverings. The moisture-retarder should be at least 15-mil in thickness and have a permeance of less than 0.01 US perms as determined by ASTM E96. Placement of the moisture-retarder will require special consideration with regard to effects on the slab-on-grade and should adhere to recommendations outlined in the ACI 302.1R and ASTM E1745 publications. The granular mat should be compacted to no less than 95 percent of the maximum dry density as determined by ASTM D1557. Upon request, MTI can provide further consultation regarding installation.

### **Recommended Pavement Sections**

MTI was provided anticipated traffic loading of 12 light passenger vehicles per day and 3 highway trucks per day. Based on experience with soils in the region, a subgrade California Bearing Ratio (CBR) value of 4 has been assumed for near-surface sandy, silty clay soils on site. The following are minimum thickness requirements for assured pavement function. Depending on site conditions, additional work, e.g. soil preparation, may be required to support construction equipment. These have been listed within the **Soft Subgrade Soils** section.

### **Flexible Pavement Section**

The American Association of State Highway and Transportation Officials (AASHTO) design method has been used to calculate the following pavement section. A calculation sheet provided in the **Appendix** indicates the soils constant, traffic loading, traffic projections, and material constants used to calculate the pavement section. MTI recommends that materials used in the construction of asphaltic concrete pavements meet requirements of the ODOT Standard Specifications for Construction. Construction of the pavement section should be in accordance with these specifications and should adhere to guidelines recommended in the section on **Construction Considerations**.

### AASHTO Flexible Pavement Specifications

Pavement Section Component <sup>1</sup>	Driveways and Parking Truck Access
Asphaltic Concrete	2.5 Inches
Crushed Aggregate Base	4.0 Inches
Structural Subbase	12.0 Inches
Compacted Subgrade	See <b>Pavement Subgrade Preparation Section</b>

<sup>1</sup>It will be required for MTI personnel to verify subgrade competency at the time of construction.

Asphaltic Concrete: Asphalt mix design shall meet the requirements of ODOT, Section 00744 plant mix. Materials shall be placed in accordance with ODOT Standard Specifications for Construction.

Aggregate Base: Material complying with ODOT Standards for Crushed Aggregate Materials.

Structural Subbase: Granular structural fill material complying with the requirements detailed in the **Structural Fill** section of this report except that the maximum material diameter is no more than  $\frac{2}{3}$  the component thickness.

### Rigid Pavement Section

The AASHTO pavement design method was used to develop the following rigid concrete pavement section. Traffic loading and subgrade values indicated in the flexible pavement design were used in developing the rigid sections. Concrete pavement shall be batched and constructed in accordance with the most current American Concrete Institute Standards and in accordance with ODOT Standard Specification for Construction. Native subgrade soils on the site are frost susceptible, and therefore, do require joint sealers or under-drains.

### Rigid Pavement Specifications

Pavement Section Component <sup>1</sup>	Driveways and Parking/ Concrete Aprons
Portland Cement Concrete	6.0 Inches
Crushed Aggregate Base	6.0 Inches
Structural Subbase	Not Required
Compacted Subgrade	See <b>Pavement Subgrade Preparation Section</b>

<sup>1</sup>It will be required for MTI personnel to verify subgrade competency at the time of construction.

Portland Cement Concrete: 4,000 psi concrete with a modulus of rupture greater than 650 psi generally complying with ODOT requirements.

Crushed Aggregate Base: Material complying with ODOT Standard Specifications for Construction.

Structural Subbase: Granular structural fill material complying with the requirements detailed in the **Structural Fill** section of this report except that the maximum material diameter is no more than  $\frac{2}{3}$  the component thickness. Gradation and suitability requirements shall be per ODOT requirements.

**Gravel Pavement Section**

The American Association of State Highway and Transportation Officials (AASHTO) design method has been used to calculate the following pavement section. A calculation sheet provided in the **Appendix** indicates the soils constant, traffic loading, traffic projections, and material constants used to calculate the pavement section. MTI recommends that materials used in the construction of gravel pavements meet requirements of the ODOT Standard Specifications for Construction. Construction of the pavement section should be in accordance with these specifications and should adhere to guidelines recommended in the section on **Construction Considerations**.

Note that gravel pavement sections are typically for low-volume roadways (ESALs of less than 100,000), and are not intended to support large amounts of regular traffic. Regular maintenance in the form of grading will be required to maintain a flat and passable condition. Soft or unstable areas will develop if water is allowed to pond or collect on the surface. Therefore, grading is required to ensure that water is directed off the pavement surface. During and shortly after storm events, tracking of surface materials can be expected. Traffic during wet periods should be avoided to limit damage to the structural section. Damage to the pavement will be in the form of rutting and/or pumping of pavement section materials. Reconstruction of the exposed gravel base should be expected at least every 5 years.

**AASHTO Gravel Pavement Specifications**

<b>Pavement Section Component<sup>1</sup></b>	<b>Driveways and Parking No Truck Access</b>
Crushed Aggregate Base	8.0 Inches
Structural Subbase	18.0 Inches
Separation Fabric	Contech C-200 or Equivalent
Compacted Subgrade	See <b>Pavement Subgrade Preparation Section</b>

<sup>1</sup>It will be required for MTI personnel to verify subgrade competency at the time of construction.

Aggregate Base: Material complying with ODOT Standards for Crushed Aggregate Materials.  
 Structural Subbase: Granular structural fill material complying with the requirements detailed in the **Structural Fill** section of this report except that the maximum material diameter is no more than  $\frac{2}{3}$  the component thickness.

### **Pavement Subgrade Preparation**

Fill materials were encountered in portions of the site. MTI recommends that these fill materials be excavated to a sufficient depth to expose competent, native soils or to a minimum depth of 1½ feet below finished subgrade. If fill materials remain after over-excavation, the exposed subgrade must be compacted to at least 95 percent of the maximum dry density as determined by ASTM D698 for flexible pavements and ASTM D1557 for rigid pavements. MTI personnel must be present during excavation to identify these materials.

### **Common Pavement Section Construction Issues**

The subgrade upon which above pavement sections are to be constructed must be properly stripped, inspected, and proof-rolled. Proof rolling of subgrade soils should be accomplished using a heavy rubber-tired, fully loaded, tandem-axle dump truck or equivalent. Verification of subgrade competence by MTI personnel at the time of construction is required. Fill materials on the site must demonstrate the indicated compaction prior to placing material in support of the pavement section. MTI anticipated that pavement areas will be subjected to moderate traffic. Subgrade clayey and silty soils near and above optimum moisture contents may pump during compaction. Pumping or soft areas must be removed and replaced with structural fill.

Fill material and aggregates in support of the pavement section must be compacted to no less than 95 percent of the maximum dry density as determined by ASTM D698 for flexible pavements and by ASTM D1557 for rigid pavements. If a material placed as a pavement section component cannot be tested by usual compaction testing methods, then compaction of that material must be approved by observed proof rolling. Minor deflections from proof rolling for flexible pavements are allowable. Deflections from proof rolling of rigid pavement support courses should not be visually detectable.

MTI recommends that rigid concrete pavement be provided for heavy garbage receptacles. This will eliminate damage caused by the considerable loading transferred through the small steel wheels onto asphaltic concrete. Rigid concrete pavement should consist of Portland Cement Concrete Pavement (PCCP) generally adhering to ITD specifications for Urban Concrete. PCCP should be 6 inches thick on a 4-inch drainage fill course (see **Floor Slab-on-Grade** section), and should be reinforced with welded wire fabric. Control joints must be on 12-foot centers or less.

## **CONSTRUCTION CONSIDERATIONS**

Recommendations in this report are based upon structural elements of the project being founded on competent, undisturbed, native sandy, silty clay soils or compacted structural fill. Structural areas should be stripped to an elevation that exposes these soil types.

## Earthwork

Excessively organic soils, deleterious materials, or disturbed soils generally undergo high volume changes when subjected to loads, which is detrimental to subgrade behavior in the area of pavements, floor slabs, structural fills, and foundations. Brush and thick grasses with associated root systems were noted at the time of our investigation. It is recommended that organic or disturbed soils, if encountered, be removed to depths of 1 foot (minimum), and wasted or stockpiled for later use. Stripping depths should be adjusted in the field to assure that the entire root zone or disturbed zone or topsoil are removed prior to placement and compaction of structural fill materials. Exact removal depths should be determined during grading operations by MTI personnel, and should be based upon subgrade soil type, composition, and firmness or soil stability. If underground storage tanks, underground utilities, wells, or septic systems are discovered during construction activities, they must be decommissioned then removed or abandoned in accordance with governing Federal, State, and local agencies. Excavations developed as the result of such removal must be backfilled with structural fill materials as defined in the **Structural Fill** section.

MTI should oversee subgrade conditions (i.e., moisture content) as well as placement and compaction of new fill (if required) after native soils are excavated to design grade. Recommendations for structural fill presented in this report can be used to minimize volume changes and differential settlements that are detrimental to the behavior of footings, pavements, and floor slabs. Sufficient density tests should be performed to properly monitor compaction. For structural fill beneath building structures, one in-place density test per lift for every 5,000 square feet is recommended. In parking and driveway areas, this can be decreased to one test per lift for every 10,000 square feet.

## Dry Weather

If construction is to be conducted during dry seasonal conditions, many problems associated with soft soils may be avoided. However, some rutting of subgrade soils may be induced by shallow groundwater conditions related to springtime runoff or irrigation activities during late summer through early fall. Solutions to problems associated with soft subgrade soils are outlined in the **Soft Subgrade Soils** section. Problems may also arise because of lack of moisture in native and fill soils at time of placement. This will require the addition of water to achieve near-optimum moisture levels. Low-cohesion soils exposed in excavations may become friable, increasing chances of sloughing or caving. Measures to control excessive dust should be considered as part of the overall health and safety management plan.

## Wet Weather

If construction is to be conducted during wet seasonal conditions (commonly from mid-November through May), problems associated with soft soils must be considered as part of the construction plan. During this time of year, fine-grained soils such as silts and clays will become unstable with increased moisture content, and eventually deform or rut. Additionally, constant low temperatures reduce the possibility of drying soils to near optimum conditions.

## Soft Subgrade Soils

Shallow fine-grained subgrade soils that are high in moisture content should be expected to pump and rut under construction traffic. During periods of wet weather, construction may become very difficult if not impossible. The following recommendations and options have been included for dealing with soft subgrade conditions:

- Track-mounted vehicles should be used to strip the subgrade of root matter and other deleterious debris. Heavy rubber-tired equipment should be prohibited from operating directly on the native subgrade and areas in which structural fill materials have been placed. Construction traffic should be restricted to designated roadways that do not cross, or cross on a limited basis, proposed roadway or parking areas.
- Soft areas can be over-excavated and replaced with granular structural fill.
- Construction roadways on soft subgrade soils should consist of a minimum 2-foot thickness of large cobbles of 4 to 6 inches in diameter with sufficient sand and fines to fill voids. Construction entrances should consist of a 6-inch thickness of clean, 2-inch minimum, angular drain-rock and must be a minimum of 10 feet wide and 30 to 50 feet long. During the construction process, top dressing of the entrance may be required for maintenance.
- Scarification and aeration of subgrade soils can be employed to reduce the moisture content of wet subgrade soils. After stripping is complete, the exposed subgrade should be ripped or disked to a depth of 1½ feet and allowed to air dry for 2 to 4 weeks. Further diskings should be performed on a weekly basis to aid the aeration process.
- Alternative soil stabilization methods include use of geotextiles, lime, and cement stabilization. MTI is available to provide recommendations and guidelines at your request.

## Frozen Subgrade Soils

Prior to placement of structural fill materials or foundation elements, frozen subgrade soils must either be allowed to thaw or be stripped to depths that expose non-frozen soils and wasted or stockpiled for later use. Stockpiled materials must be allowed to thaw and return to near-optimal conditions prior to use as structural fill.

The onsite, shallow clayey and silty soils are susceptible to frost heave during freezing temperatures. For exterior flatwork and other structural elements, adequate drainage away from subgrades is critical. Compaction and use of structural fill will also help to mitigate the potential for frost heave. Complete removal of frost susceptible soils for the full frost depth, followed by replacement with a non-frost susceptible structural fill, can also be used to mitigate the potential for frost heave. MTI is available to provide further guidance/assistance upon request.

## Structural Fill

Soils recommended for use as structural fill are those classified as GW, GP, SW, and SP in accordance with the Unified Soil Classification System (USCS) (ASTM D2487). Use of silty soils (USCS designation of GM, SM, and ML) as structural fill may be acceptable. However, use of silty soils (GM, SM, and ML) as structural fill below footings is prohibited. These materials require very high moisture contents for compaction and require a long time to dry out if natural moisture contents are too high and may also be susceptible to frost heave under certain conditions. Therefore, these materials can be quite difficult to work with as moisture content, lift thickness, and compactive effort becomes difficult to control. If silty soil is used for structural fill, lift thicknesses should not exceed 6 inches (loose), and fill material moisture must be closely monitored at both the working elevation and the elevations of materials already placed. Following placement, silty soils must be protected from degradation resulting from construction traffic or subsequent construction.

Recommended granular structural fill materials, those classified as GW, GP, SW, and SP, should consist of a 6-inch minus select, clean, granular soil with no more than 50 percent oversize (greater than ¾-inch) material and no more than 12 percent fines (passing No. 200 sieve). These fill materials should be placed in layers not to exceed 12 inches in loose thickness. Prior to placement of structural fill materials, surfaces must be prepared as outlined in the **Construction Considerations** section. Structural fill material should be moisture-conditioned to achieve optimum moisture content prior to compaction. For structural fill below footings, areas of compacted backfill must extend outside the perimeter of the footings for a distance equal to the thickness of fill between the bottom of foundation and underlying soils, or 5 feet, whichever is less. All fill materials must be monitored during placement and tested to confirm compaction requirements, outlined below, have been achieved.

Each layer of structural fill must be compacted, as outlined below:

- Below Structures and Rigid Pavements: A minimum of 95 percent of the maximum dry density as determined by ASTM D1557.
- Below Flexible Pavements: A minimum of 92 percent of the maximum dry density as determined by ASTM D1557 or 95 percent of the maximum dry density as determined by ASTM D698.

The ASTM D1557 test method must be used for samples containing up to 40 percent oversize (greater than ¾-inch) particles. If material contains more than 40 percent but less than 50 percent oversize particles, compaction of fill must be confirmed by proof rolling each lift with a 10-ton vibratory roller (or equivalent) until the maximum density has been achieved. Density testing must be performed after each proof rolling pass until the in-place density test results indicate a drop (or no increase) in the dry density, defined as maximum density or “break over” point. The number of required passes should be used as the requirements on the remainder of fill placement. Material should contain sufficient fines to fill void spaces, and must not contain more than 50 percent oversize particles.

## Backfill of Walls

Backfill materials must conform to the requirements of structural fill, as defined in this report. For wall heights greater than 2.5 feet, the maximum material size should not exceed 4 inches in diameter. Placing oversized material against rigid surfaces interferes with proper compaction, and can induce excessive point loads on walls.



Backfill shall not commence until the wall has gained sufficient strength to resist placement and compaction forces. Further, retaining walls above 2.5 feet in height shall be backfilled in a manner that will limit the potential for damage from compaction methods and/or equipment. It is recommended that only small hand-operated compaction equipment be used for compaction of backfill within a horizontal distance equal to the height of the wall, measured from the back face of the wall.

Backfill should be compacted in accordance with the specifications for structural fill, except in those areas where it is determined that future settlement is not a concern, such as planter areas. In nonstructural areas, backfill must be compacted to a firm and unyielding condition.

### **Excavations**

Shallow excavations that do not exceed 4 feet in depth may be constructed with side slopes approaching vertical. Below this depth, it is recommended that slopes be constructed in accordance with Occupational Safety and Health Administration (OSHA) regulations, Section 1926, Subpart P. Based on these regulations, on-site soils are classified as type "B" soil, and as such, excavations within these soils should be constructed at a maximum slope of 1½ feet horizontal to 1 foot vertical (1:1) for excavations up to 20 feet in height. Excavations in excess of 20 feet will require additional analysis. Note that these slope angles are considered stable for short-term conditions only, and will not be stable for long-term conditions.

During the subsurface exploration, test pit/hand boring sidewalls generally exhibited little indication of collapse. Care must be taken to ensure that excavations are properly backfilled in accordance with procedures outlined in this report.

### **Groundwater Control**

Groundwater was not encountered during the investigation and is anticipated to be below the depth of most construction. Special precautions may be required for control of surface runoff and subsurface seepage. It is recommended that runoff be directed away from open excavations. Silty and clayey soils may become soft and pump if subjected to excessive traffic during time of surface runoff. Pondered water in construction areas should be drained through methods such as trenching, sloping, crowning grades, nightly smooth drum rolling, or installing a French drain system. Additionally, temporary or permanent driveway sections should be constructed if extended wet weather is forecasted.

## **GENERAL COMMENTS**

When plans and specifications are complete, or if significant changes are made in the character or location of the proposed structure, consultation with MTI should be arranged as supplementary recommendations may be required. Suitability of subgrade soils and compaction of structural fill materials must be verified by MTI personnel prior to placement of structural elements. Additionally, monitoring and testing should be performed to verify that suitable materials are used for structural fill and that proper placement and compaction techniques are utilized.

## REFERENCES

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## APPENDICES

### ACRONYM LIST

<b>AASHTO:</b>	American Association of State Highway and Transportation Officials
<b>ACHD:</b>	Ada County Highway District
<b>ACI</b>	American Concrete Institute
<b>ASCE</b>	American Society of Civil Engineers
<b>ASTM:</b>	American Society for Testing and Materials
<b>bgs:</b>	below ground surface
<b>CBR:</b>	California Bearing Ratio
<b>D:</b>	natural dry unit weight, pcf
<b>ESAL</b>	Equivalent Single Axle Load
<b>GS:</b>	grab sample
<b>IBC:</b>	International Building Code
<b>LL:</b>	Liquid Limit
<b>M:</b>	water content
<b>MSL:</b>	mean sea level
<b>N:</b>	Standard "N" penetration: blows per foot, Standard Penetration Test
<b>NP:</b>	nonplastic
<b>ODOT</b>	Oregon Department of Transportation
<b>OSHA</b>	Occupational Safety and Health Administration
<b>PCCP:</b>	Portland Cement Concrete Pavement
<b>PERM:</b>	vapor permeability
<b>PI:</b>	Plasticity Index
<b>PID:</b>	photoionization detector
<b>PVC:</b>	polyvinyl chloride
<b>Qc:</b>	cone penetrometer value, unconfined compressive strength, psi
<b>Qp:</b>	Penetrometer value, unconfined compressive strength, tsf
<b>Qu:</b>	Unconfined compressive strength, tsf
<b>RMR</b>	Rock Mass Rating
<b>RQD</b>	Rock Quality Designation
<b>R-Value</b>	Resistance Value
<b>SPT:</b>	Standard Penetration Test (140:pound hammer falling 30 in. on a 2:in. split spoon)
<b>USCS:</b>	Unified Soil Classification System
<b>USDA:</b>	United States Department of Agriculture
<b>UST:</b>	underground storage tank
<b>V:</b>	vane value, ultimate shearing strength, tsf

### GEOTECHNICAL GENERAL NOTES

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION			
Coarse-Grained Soils	SPT Blow Counts (N)	Fine-Grained Soils	SPT Blow Counts (N)
Very Loose:	< 4	Very Soft:	< 2
Loose:	4-10	Soft:	2-4
Medium Dense:	10-30	Medium Stiff:	4-8
Dense:	30-50	Stiff:	8-15
Very Dense:	>50	Very Stiff:	15-30
		Hard:	>30

Moisture Content	
Description	Field Test
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but not visible moisture
Wet	Visible free water, usually soil is below water table

Cementation	
Description	Field Test
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

PARTICLE SIZE					
Boulders:	>12 in.	Coarse-Grained Sand:	5 to 0.6 mm	Silts:	0.075 to 0.005 mm
Cobbles:	12 to 3 in.	Medium-Grained Sand:	0.6 to 0.2 mm	Clays:	<0.005 mm
Gravel:	3 in. to 5 mm	Fine-Grained Sand:	0.2 to 0.075 mm		

UNIFIED SOIL CLASSIFICATION SYSTEM			
Major Divisions		Symbol	Soil Descriptions
Coarse-Grained Soils <50% passes No.200 sieve	Gravel & Gravelly Soils <50% coarse fraction passes No.4 sieve	GW	Well-graded gravels; gravel/sand mixtures with little or no fines
		GP	Poorly-graded gravels; gravel/sand mixtures with little or no fines
		GM	Silty gravels; poorly-graded gravel/sand/silt mixtures
		GC	Clayey gravels; poorly-graded gravel/sand/clay mixtures
	Sand & Sandy Soils >50% coarse fraction passes No.4 sieve	SW	Well-graded sands; gravelly sands with little or no fines
		SP	Poorly-graded sands; gravelly sands with little or no fines
		SM	Silty sands; poorly-graded sand/gravel/silt mixtures
		SC	Clayey sands; poorly-graded sand/gravel/clay mixtures
Fine Grained Soils >50% passes No.200 sieve	Silts & Clays LL < 50	ML	Inorganic silts; sandy, gravelly or clayey silts
		CL	Lean clays; inorganic, gravelly, sandy, or silty, low to medium-plasticity clays
		OL	Organic, low-plasticity clays and silts
	Silts & Clays LL > 50	MH	Inorganic, elastic silts; sandy, gravelly or clayey elastic silts
		CH	Fat clays; high-plasticity, inorganic clays
		OH	Organic, medium to high-plasticity clays and silts
Highly Organic Soils	PT	Peat, humus, hydric soils with high organic content	

**GEOTECHNICAL INVESTIGATION TEST PIT LOG**

**Test Pit Log #:** TP-1    **Date Advanced:** 27 July 2017    **Logged by:** Clint Wyllie, G.I.T.

**Excavated by:** Client Supplied Backhoe

**Location:** See Site Map Plates

**Latitude:** 45.71967

**Longitude:** -120.17719

**Depth to Water Table:** Not Encountered

**Total Depth:** 8.0 Feet bgs

Depth (Feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (Feet bgs)	Qp	Lab Test ID
0.0-2.1	Sandy Silt Fill (ML-FILL): <i>Light brown to whitish, dry, very stiff to hard, with fine-grained sand.</i>			2.5-4.5+	
2.1-8.0	Sandy, Silty Clay (CL-ML): <i>Red-brown to whitish, dry, hard, with fine-grained sand.</i> --Minor fine to coarse gravel encountered from 3.3 to 4.5 feet bgs. --Moderate to strong calcic cementation encountered from 4.5 to 8.0 feet bgs.				

### GEOTECHNICAL INVESTIGATION TEST PIT LOG

**Test Pit Log #:** TP-2    **Date Advanced:** 27 July 2017    **Logged by:** Clint Wyllie, G.I.T.

**Excavated by:** Client Supplied Backhoe

**Location:** See Site Map Plates

**Latitude:** 45.71921

**Longitude:** -120.17677

**Depth to Water Table:** Not Encountered

**Total Depth:** 7.2 Feet bgs

Depth (Feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (Feet bgs)	Qp	Lab Test ID
0.0-7.2	Sandy, Silty Clay (CL-ML): <i>Brown to whitish, dry, hard, with fine-grained sand.</i> --Organics noted to 0.8 foot bgs. --Minor fine to coarse gravel encountered from 4.6 to 5.9 feet bgs. --Moderate to strong calcic cementation encountered from 4.6 to 7.2 feet bgs.	GS	2.0-2.5	4.5+	A

Lab Test ID	M	LL	PI	Sieve Analysis (% passing)				
				#4	#10	#40	#100	#200
-	%	-	-	#4	#10	#40	#100	#200
A	5.9	23	4	100	100	98	89	69.7

**GEOTECHNICAL INVESTIGATION TEST PIT LOG**

**Test Pit Log #:** TP-3    **Date Advanced:** 27 July 2017    **Logged by:** Clint Wyllie, G.I.T.

**Excavated by:** Client Supplied Backhoe    **Location:** See Site Map Plates

**Latitude:** 45.71828    **Longitude:** -120.17695

**Depth to Water Table:** Not Encountered    **Total Depth:** 9.6 Feet bgs

Depth (Feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (Feet bgs)	Qp	Lab Test ID
0.0-9.6	Sandy, Silty Clay (CL-ML): <i>Brown to whitish, dry, very stiff to hard, with fine-grained sand.</i> --Organics noted to 0.4 foot bgs. --Weak to moderate calcic cementation encountered from 8.5 to 9.6 feet bgs.			2.25-4.5+	

**GEOTECHNICAL INVESTIGATION HAND BORING LOG**

**Hand Boring Log #:** HB-1    **Date Advanced:** 27 July 2017    **Logged by:** Clint Wyllie, G.I.T.

**Excavated by:** MTI Hand Auger

**Location:** See Site Map Plates

**Latitude:** 45.71825

**Longitude:** -120.17686

**Depth to Water Table:** Not Encountered

**Total Depth:** 3.0 Feet bgs

**Notes:** 4-inch diameter PVC pipe installed at 3.0 feet bgs for infiltration testing.

Depth (Feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (Feet bgs)	Qp	Lab Test ID
0.0-3.0	Sandy, Silty Clay (CL-ML): <i>Brown, dry, stiff to very stiff, with fine-grained sand.</i>				



## AASHTO PAVEMENT THICKNESS DESIGN PROCEDURES

Pavement Section Design Location: Proposed Flex Building, Truck Access

Average Daily Traffic Count:	30 All Lanes & Both Directions	
Design Life:	20 Years	
Percent of Traffic in Design Lane:	50%	
Terminal Serviceability Index (Pt):	2.5	
Level of Reliability:	95	
Subgrade CBR Value:	4	Subgrade Mr: 6,000

### Calculation of Design-18 kip ESALs

	Daily Traffic	Growth Rate	Load Factors	Design ESALs
Passenger Cars:	6	2.0%	0.0008	43
Buses:	0	2.0%	0.6806	0
Panel & Pickup Trucks:	6	2.0%	0.0122	649
2-Axle, 6-Tire Trucks:	0	2.0%	0.1890	0
Concrete Trucks:	1.0	2.0%	4.4800	39,731
Dump Trucks:	2	2.0%	3.6300	64,386
Tractor Semi Trailer Trucks:	0	2.0%	2.3719	0
Double Trailer Trucks:	0	2.0%	2.3187	0
Heavy Tractor Trailer Combo Trucks:	0	2.0%	2.9760	0
Average Daily Traffic in Design Lane:	15			

Total Design Life 18-kip ESALs: 104,808

Actual Log (ESALs): 5.020

Trial SN: 2.78

Trial Log (ESALs): 5.027

Pavement Section Design SN: 2.81

	Design Depth Inches	Structural Coefficient	Drainage Coefficient
Asphaltic Concrete:	2.50	0.42	n/a
Asphalt-Treated Base:	0.00	0.25	n/a
Cement-Treated Base:	0.00	0.17	n/a
Crushed Aggregate Base:	4.00	0.14	1.0
Subbase:	12.00	0.10	1.0
Special Aggregate Subgrade:	0.00	0.09	0.9

## AASHTO RIGID PAVEMENT THICKNESS DESIGN PROCEDURES

**Pavement Section Design Location:** Proposed Flex Building, Concrete Aprons

<b>Average Daily Traffic Count:</b>	30	All Lanes & Both Directions	
<b>Design Life:</b>	20	Years	
<b>% of Traffic in Design Lane:</b>	50%		
<b>Terminal Serviceability Index, Pt:</b>	2		
<b>Level of Reliability, R:</b>	95		<b>R-Value:</b> 9
<b>Subgrade CBR Value:</b>	4		<b>Subgrade Mr:</b> 6,000
<b>Native Modulus of Subgrade Reaction, K:</b>	110		
<b>Effective Modulus of Subgrade Reaction, K:</b>	160		
<b>Concrete Elastic Modulus, Ec:</b>	4200000		
<b>Modulus of Rupture, S'c:</b>	650		
<b>Load Transfer Coefficient, J:</b>	4.2		
<b>Drainage Coefficient, Cd:</b>	1		
<b>Standard Deviation, So:</b>	0.34		
<b>Design Serviceability Loss, Delta PSI:</b>	2.5		

### Calculation of Design 18 kip ESALs

	Daily Traffic	Growth Rate	Load Factors	Design ESAL's
Passenger Cars:	6	2.0%	0.0008	43
Buses:	0	2.0%	0.6806	0
Panel & Pickup Trucks:	6	2.0%	0.0122	649
2 Axle, 6 Tire Trucks:	0	2.0%	0.1890	0
Concrete Trucks:	1	2.0%	4.4800	39,731
Dump Trucks:	2	2.0%	3.6300	64,386
Tractor Semi Trailer Trucks:	0	2.0%	2.3719	0
Double Trailer Trucks:	0	2.0%	2.3187	0
Heavy Tractor Trailer Combo Trucks:	0	2.0%	2.9760	0
<b>Average Daily Traffic in Design Lane:</b>	<b>15</b>			

**Total Design Life 18 kip ESAL's:** 104,808      Traffic Index equivalent= 6.9

**Actual Log (ESAL's):** 5.020

**Trial Pavement Design Thickness, inches:** 6.00

**Trial Log (ESAL's):** 5.233

**Pavement Design Thickness, Inches:** 6.0

**Road Mix Section Thickness, Inches:** 6.0

**AASHTO GRAVEL PAVEMENT THICKNESS DESIGN PROCEDURES**

**Pavement Section Design Location:** Proposed Flex Building, Truck Access

**Average Daily Traffic Count:** 30 All Lanes & Both Directions  
**Design Life:** 20 Years  
**Percent of Traffic in Design Lane:** 50%  
**Terminal Serviceability Index (Pt):** 2.5  
**Level of Reliability:** 95  
**Subgrade CBR Value:** 4 **Subgrade Mr:** 6,000

**Calculation of Design-18 kip ESALs**

	Daily Traffic	Growth Rate	Load Factors	Design ESALs
Passenger Cars:	6	2.0%	0.0008	43
Buses:	0	2.0%	0.6806	0
Panel & Pickup Trucks:	6	2.0%	0.0122	649
2-Axle, 6-Tire Trucks:	0	2.0%	0.1890	0
Concrete Trucks:	1.0	2.0%	4.4800	39,731
Dump Trucks:	2	2.0%	3.6300	64,386
Tractor Semi Trailer Trucks:	0	2.0%	2.3719	0
Double Trailer Trucks:	0	2.0%	2.3187	0
Heavy Tractor Trailer Combo Trucks:	0	2.0%	2.9760	0
Average Daily Traffic in Design Lane:	15			

**Total Design Life 18-kip ESALs:** 104,808

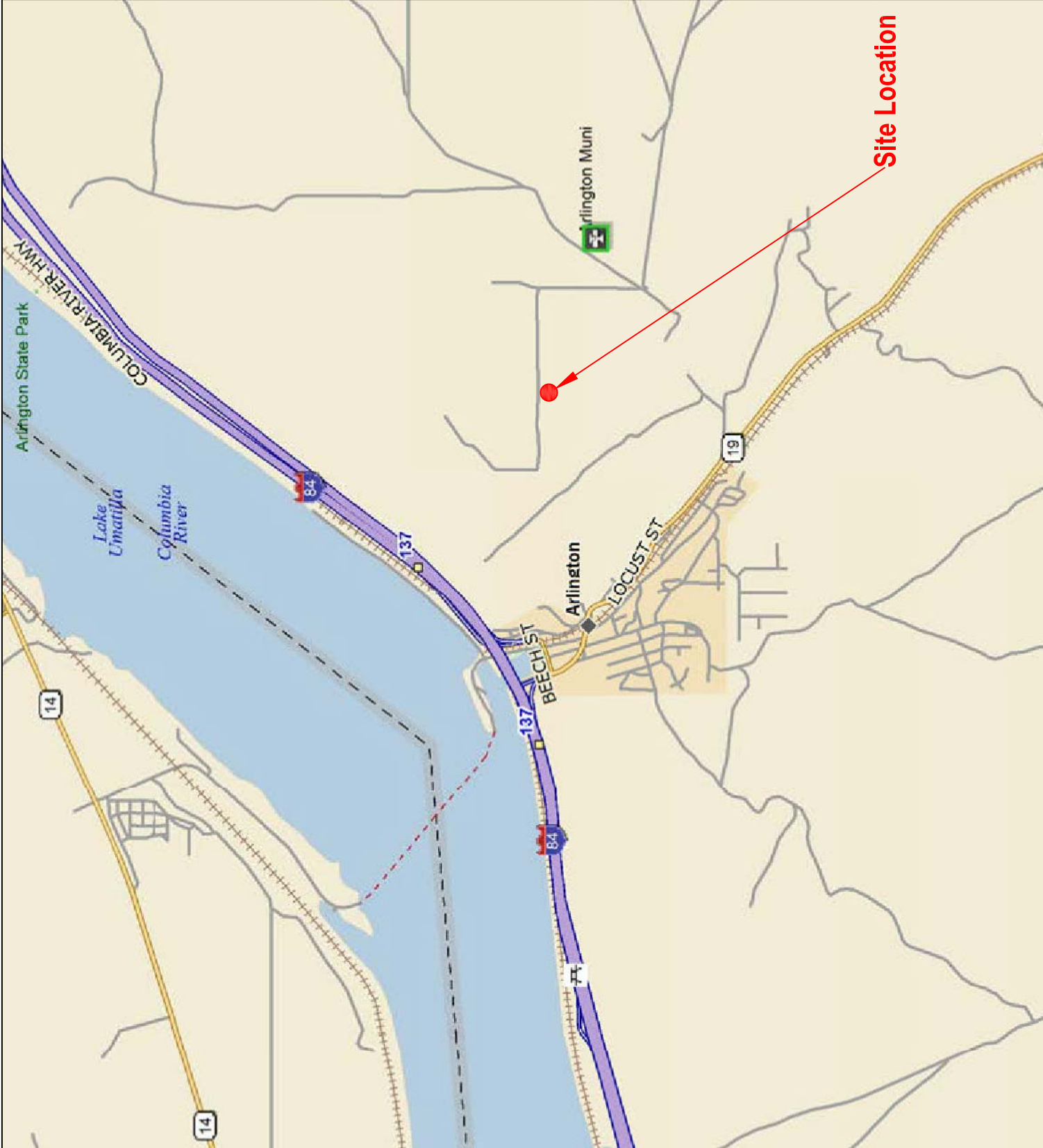
**Actual Log (ESALs):** 5.020

**Trial SN:** 2.78

**Trial Log (ESALs):** 5.027

**Pavement Section Design SN:** 2.92

	Design Depth Inches	Structural Coefficient	Drainage Coefficient
Asphaltic Concrete:	0.00	0.42	n/a
Asphalt-Treated Base:	0.00	0.25	n/a
Cement-Treated Base:	0.00	0.17	n/a
Crushed Aggregate Base:	8.00	0.14	1.0
Pit Run Aggregate Subgrade:	18.00	0.10	1.0
Special Aggregate Subgrade:	0.00	0.09	0.9



**MAP NOTES:**

- Delorme Street Atlas
- Not to Scale

**LEGEND**

- Approximate Site Location



**Flex Building Site, Arlington Mesa Industrial Park**

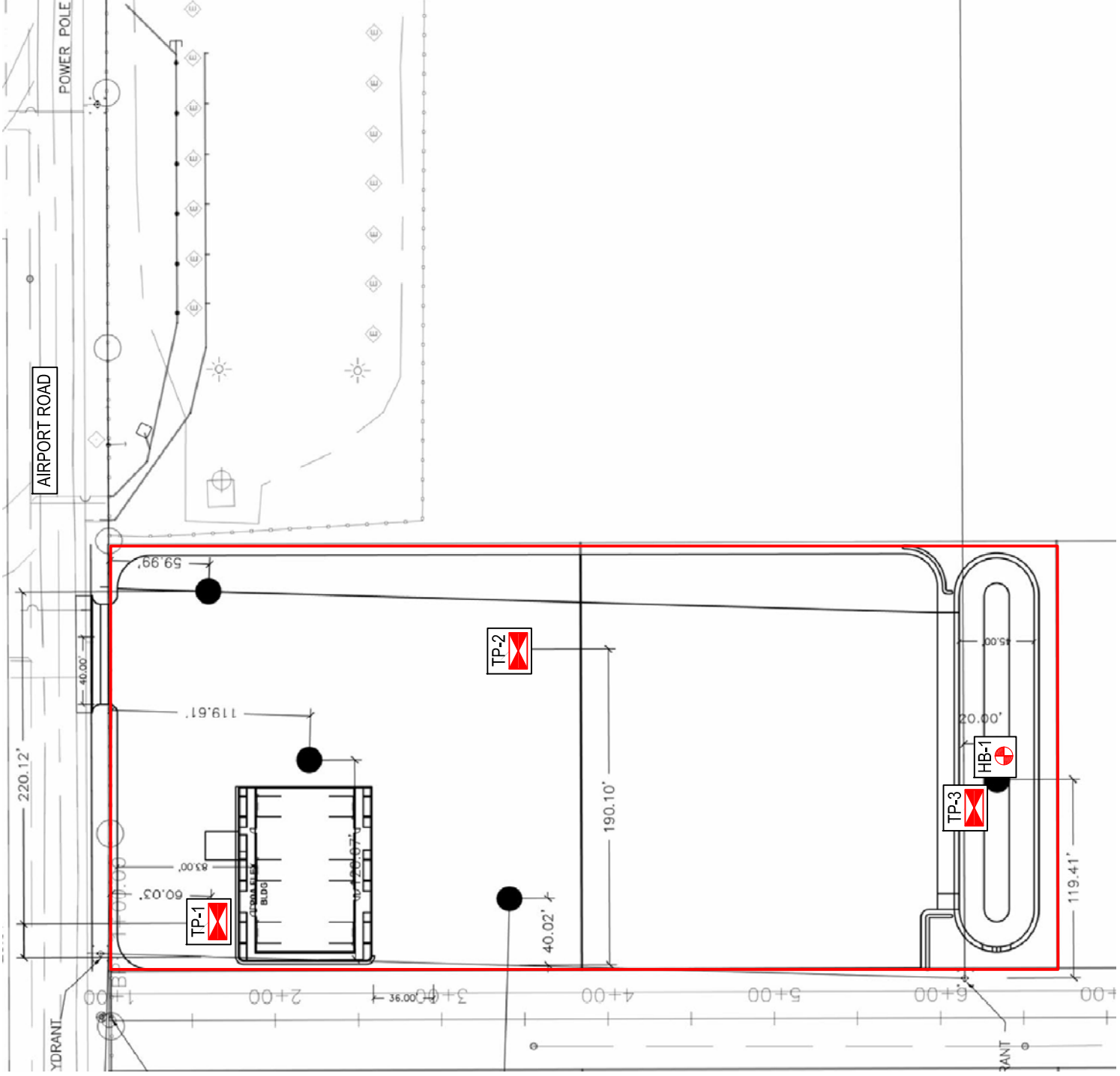
Airport Road  
Arlington, OR

Modified from Delorme by: CCW  
31 July 2017  
Drawing: B171044g

**Site Location**



2791 S. Victory View Way  
Boise, ID 83709-2835  
Phone: 208 376-4748  
Fax: 208 322-6515  
E-mail: [mti@mti-id.com](mailto:mti@mti-id.com)



**NOTES:**

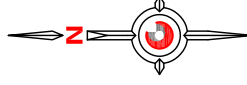
- Not to Scale

**LEGEND**

Approximate Site Boundary

Approximate MTI Test Pit Location

Approximate MTI Hand Boring Location



Flex Building Site, Arlington Mesa  
Industrial Park

Airport Road  
Arlington, OR

Modified by: CCW  
31 July 2017  
Drawing: B171044g



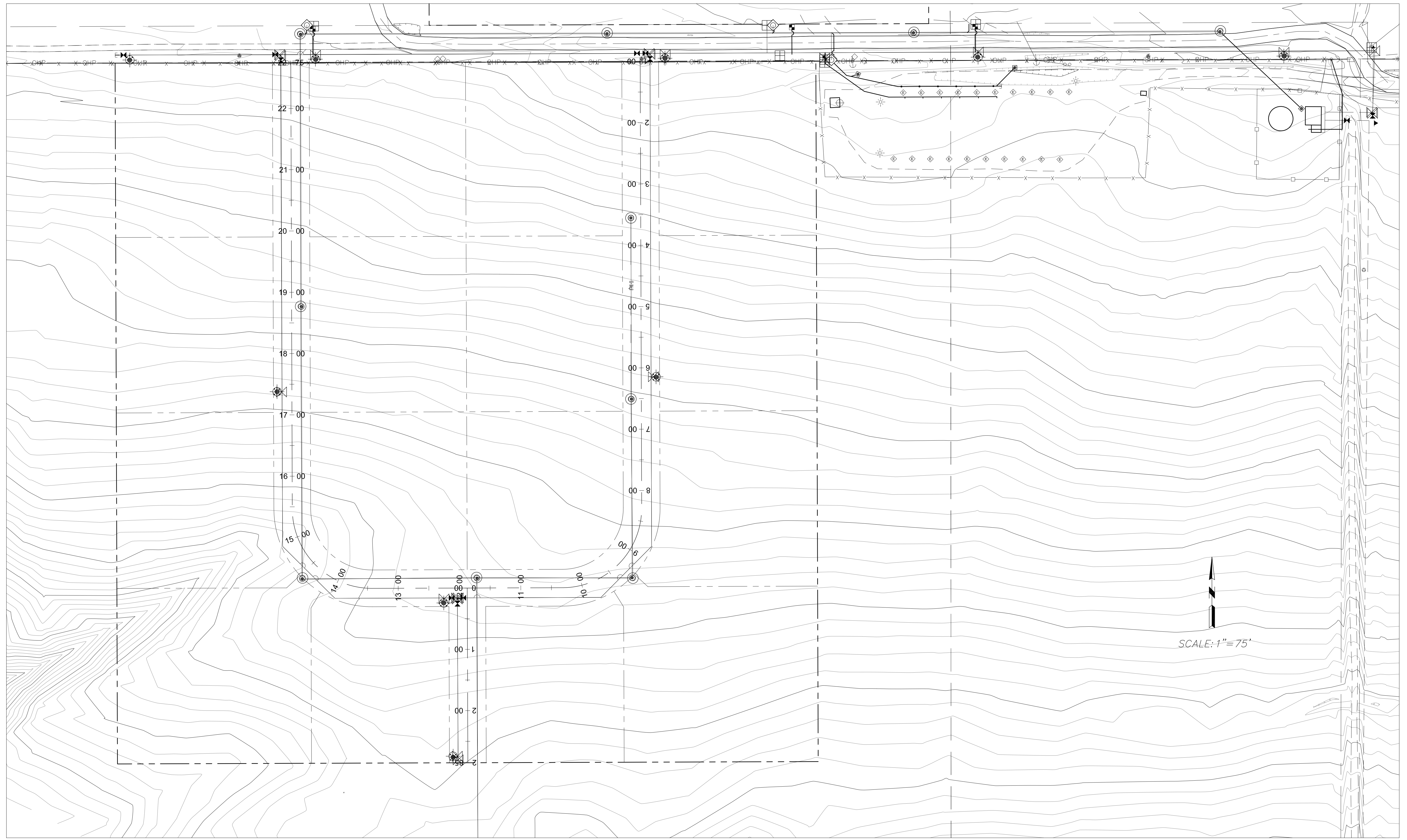
**MATERIALS  
TESTING &  
INSPECTION**


Phone: 208 376-4748  
Fax: 208 322-6515  
E-mail: mti@mti-hd.com

2791 S. Victory View Way  
Boise, ID 83709-2835

# **EXISTING SITE SURVEY & RECORD DRAWINGS**

**Reference Site Survey – Record Drawings from Arlington Mesa Industrial Park Project  
2014**




  
 SCALE: 1" = 75'

REVISION	BY	DATE	HORZ. SCALE 1" = 75'	VERT. SCALE
DESIGNED BY	XREFS: ??		JOB NUMBER 41-07	DATE MARCH 03, 2014
DRAWN BY			ACAD FILE:	
REVIEWED BY			COPYRIGHT 2012 BY ANDERSON PERRY & ASSOC., INC.	

THIS DRAWING HAS BEEN REDUCED 50%.  
 ADJUST SCALE ACCORDINGLY.  
 BARSCALE SHOWN IS ACCURATE.

**PRELIMINARY**  
 NOT FOR CONSTRUCTION

  
**anderson perry & associates, inc.**  
 engineering • surveying • natural resources  
 LA GRANDE, OR. WALLA WALLA, WA.

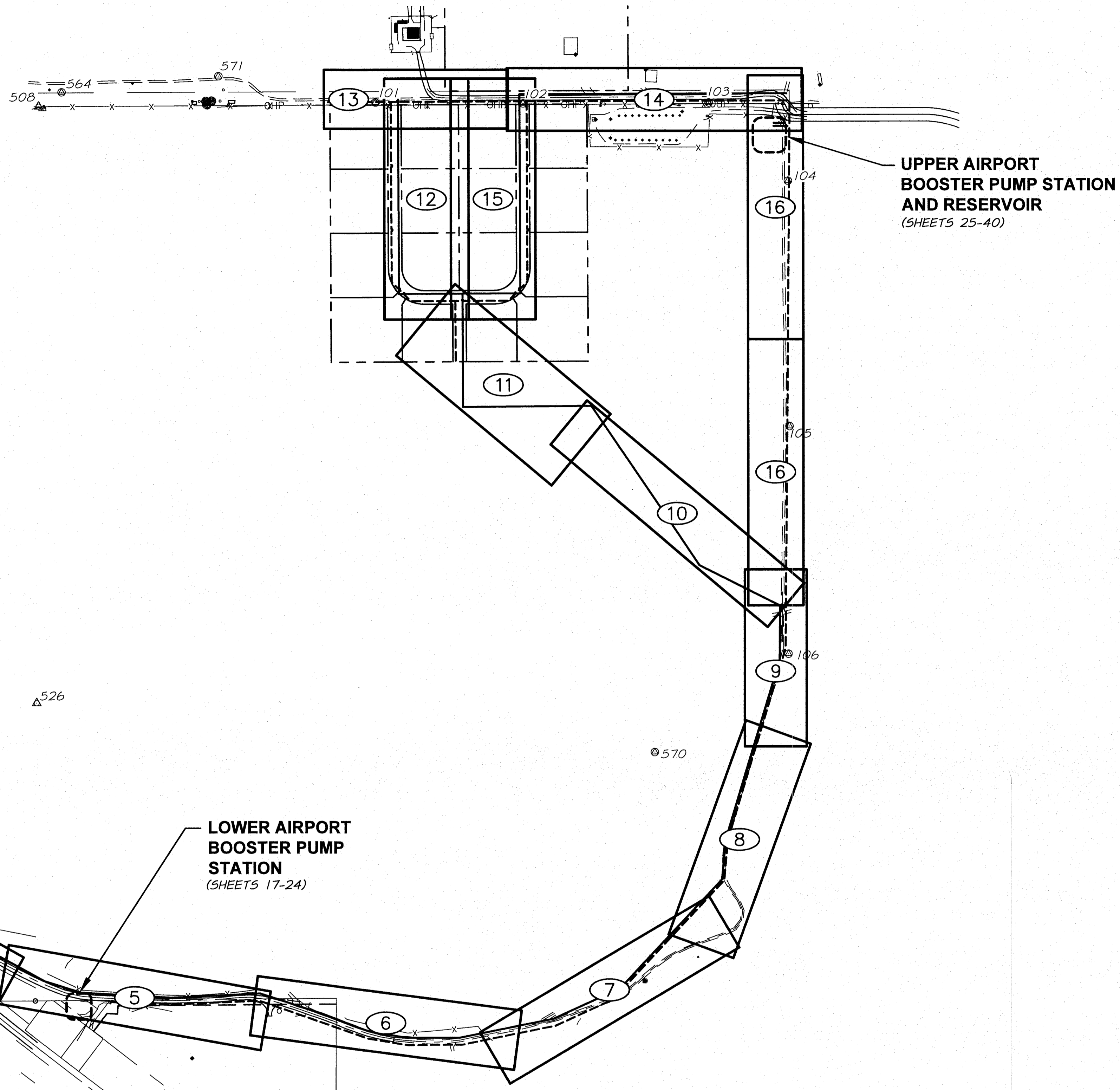
**PORT OF ARLINGTON**  
**MESA INDUSTRIAL PARK**  
**CENTERLINE/COMPED CORNERS**

SHEET

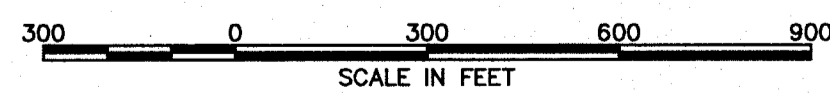
**LEGEND**

④ SHEET NUMBER

TABLE OF PRIMARY CONTROL POINTS				
PT	Northing (ft)	Easting (ft)	Elevation (ft)	Description
101	748776.995	8284669.858	883.081	APA_H+T
102	748772.253	8285325.909	888.877	APA_H+T
103	748776.288	8286152.559	889.999	APA_H+T
104	748427.637	8286504.174	882.367	APA_H+T
105	747339.550	8286509.471	842.128	APA_H+T
106	746337.079	8286505.203	827.487	APA_H+T
501	749141.054	8288194.203	924.900	AVIS
508	748760.459	8283170.311	874.800	SW SEC22
526	746119.954	8283159.693	573.600	W1/4 SEC27
557	744940.579	8281638.814	373.274	PK
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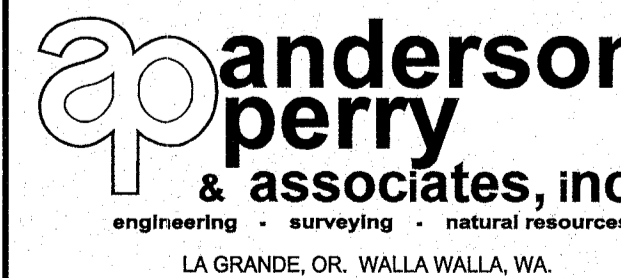


REVISION	BY	DATE	HORIZ. SCALE 1"=300'	VERT. SCALE
DESIGNED BY P. BALDNER			JOB NUMBER 42-63	DATE 2012
DRAWN BY E. ARNTZ			ACAD FILE: Index.dwg	
REVIEWED BY B. BAIRD			COPYRIGHT 2013 BY ANDERSON-PERRY & ASSOC., INC.	



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12-18-13

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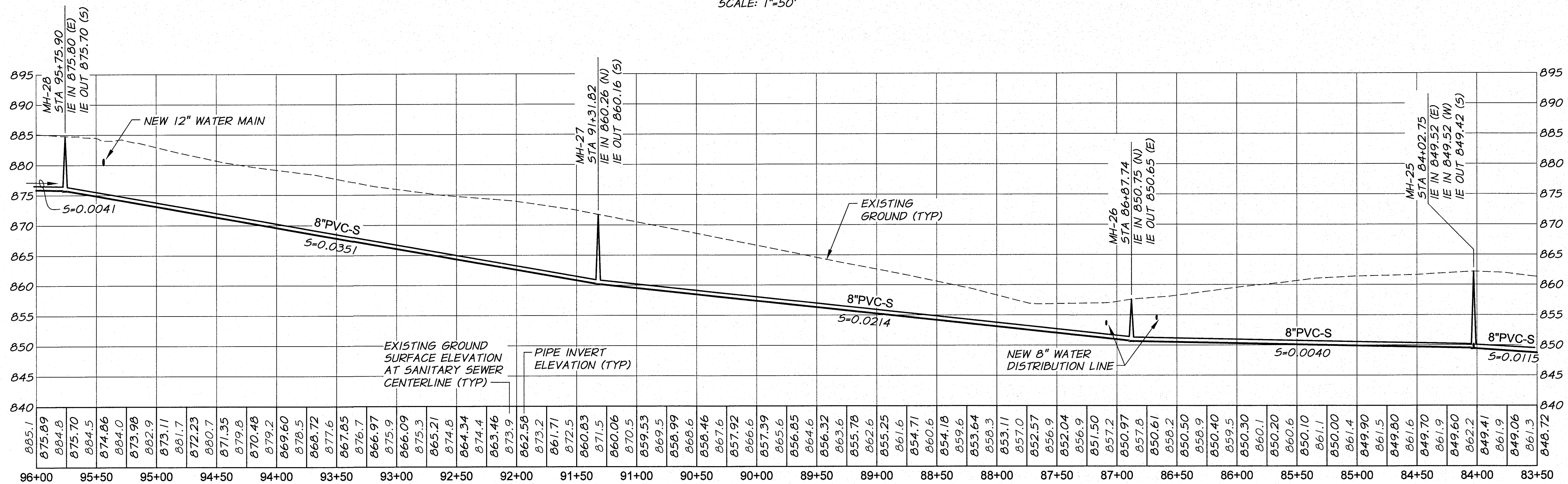
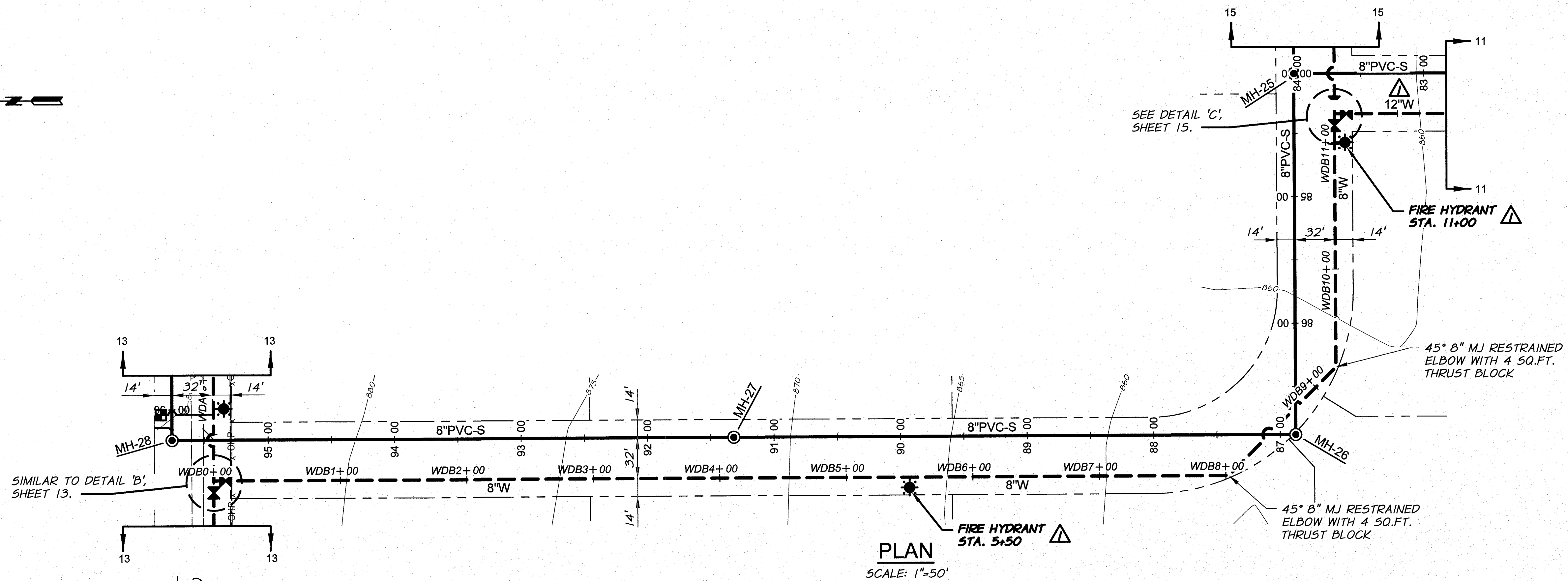
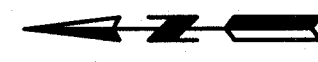
**CITY OF ARLINGTON**  
MESA INDUSTRIAL PARK  
WATER AND SEWER IMPROVEMENTS

SHEET INDEX

SHEET

1





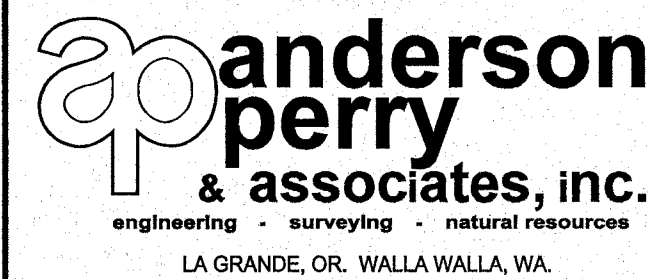
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EDGE OF MANHOLE TO EDGE OF MANHOLE



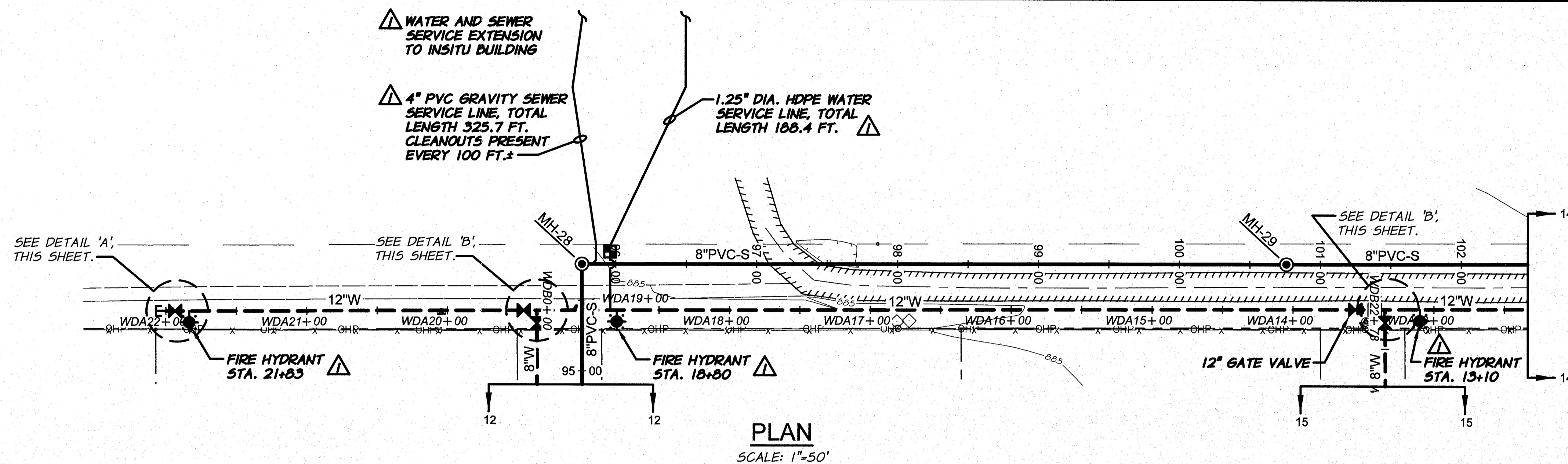
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DRAWN BY	E. ARNITZ	VERT. SCALE	1"=10'
REVIEWED BY	B. BAIRD	JOB NUMBER	42-63
		DATE	2012
		ACAD FILE	Design9-21 - Arlington Airport.DWG
		COPYRIGHT 2013 BY ANDERSON-PERRY & ASSOC., INC.	

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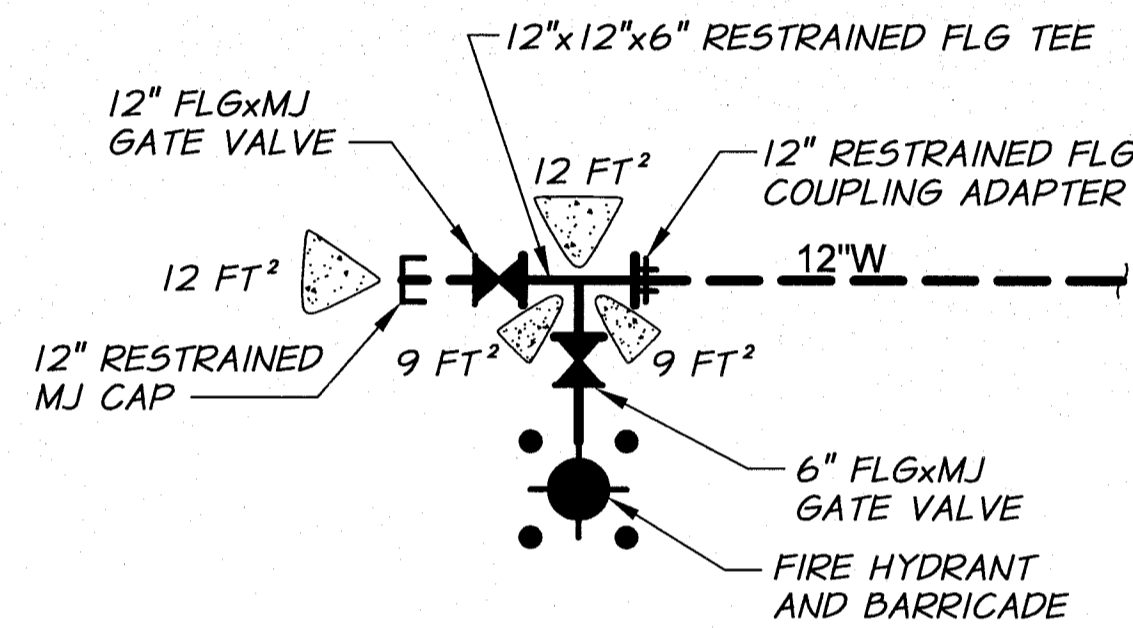
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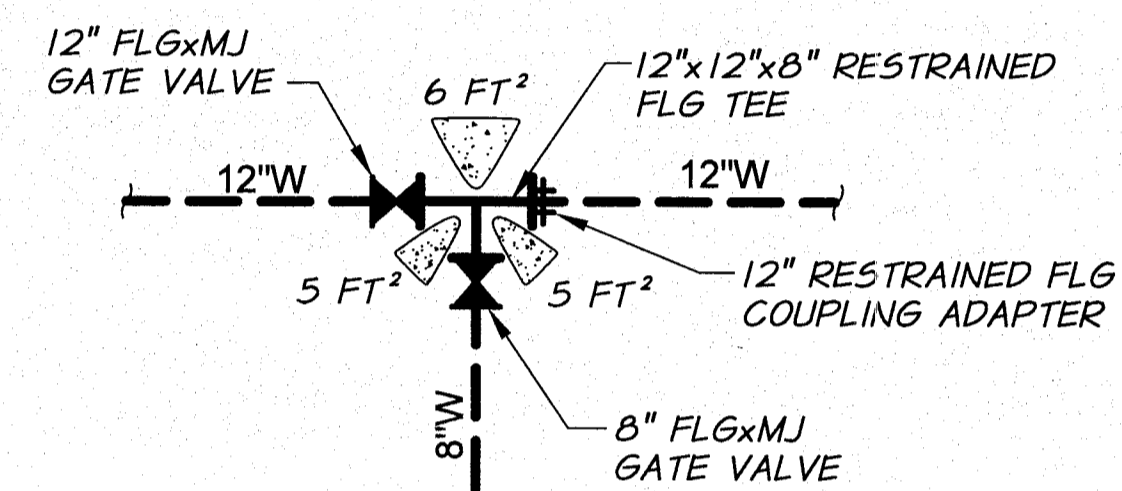
**CITY OF ARLINGTON**  
MESA INDUSTRIAL PARK  
WATER AND SEWER IMPROVEMENTS  
SANITARY SEWER STA 84+50 TO STA 95+50  
8" WATER DISTRIBUTION LINE  
STA WDB0+00 TO STA WDB11+50



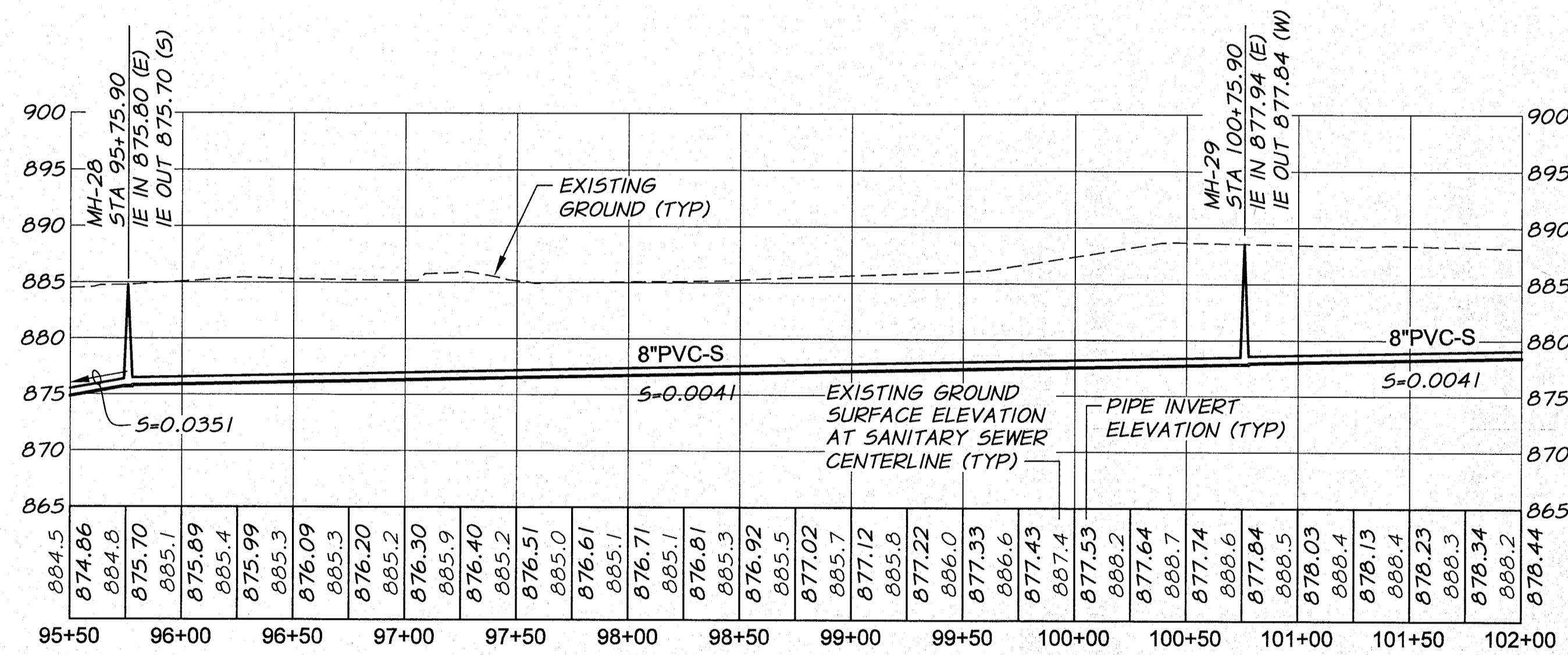
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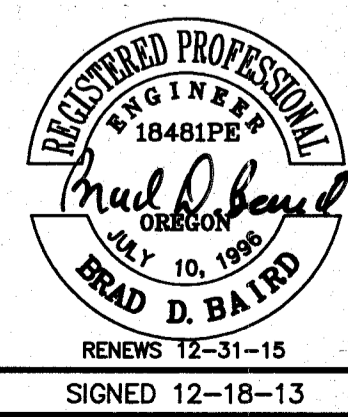
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**DETAIL B**  
N.T.S.

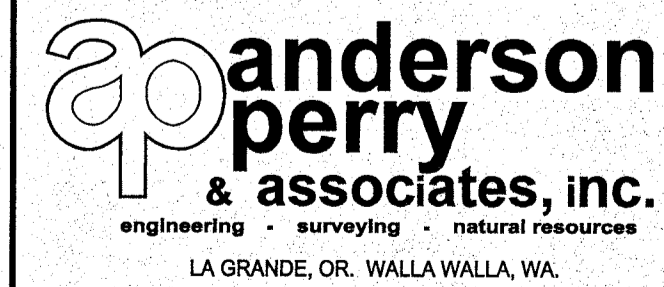


**PROFILE**  
**SANITARY SEWER**  
SCALE: 1"=50' HORIZONTAL  
1"=10' VERTICAL

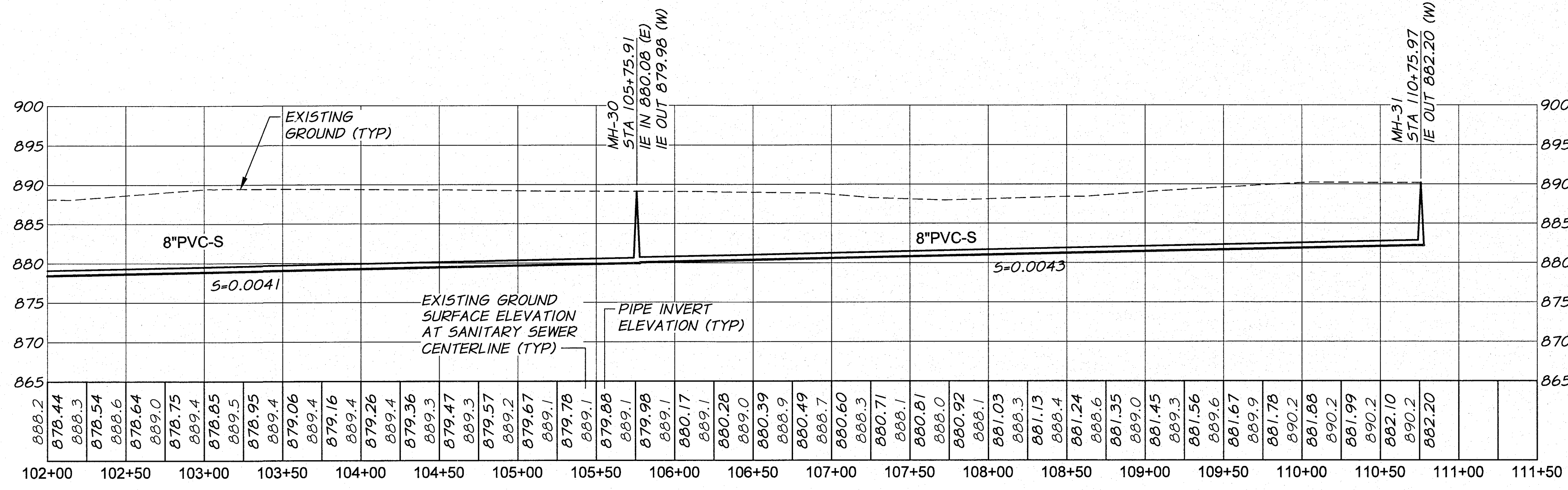
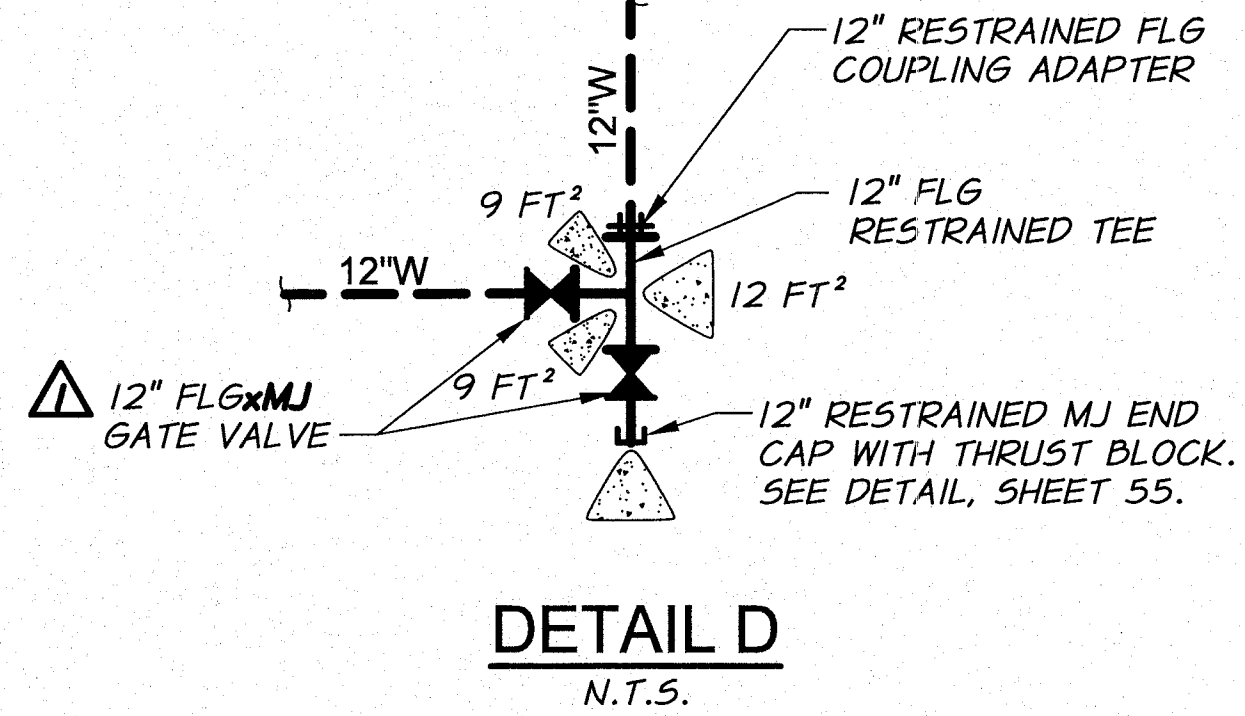
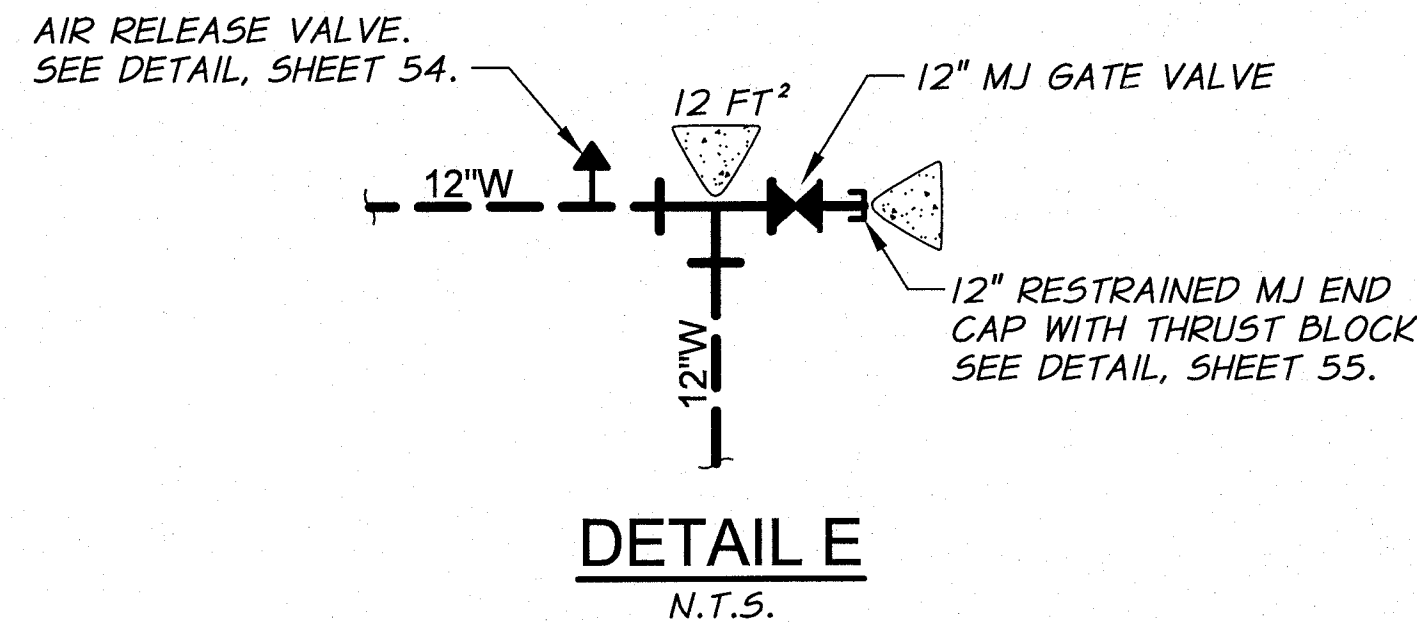
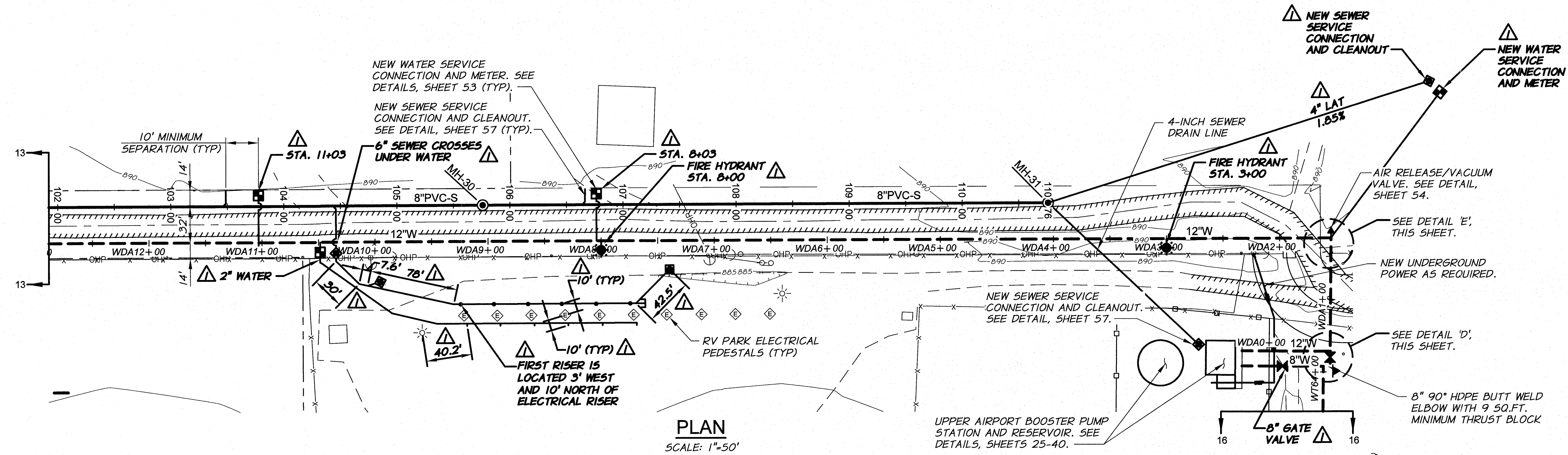


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RECORD DRAWINGS		B.B.		12/13	
DESIGNED BY	P. BALDNER	HORIZ. SCALE	1"=50'	VERT. SCALE	1"=10'
DRAWN BY	E. ARNTZ	JOB NUMBER	42-63	DATE	2012
REVIEWED BY	B. BAIRD	ACAD FILE	Design9-21 - Arlington Airport.DWG		
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<b>CITY OF ARLINGTON</b> MESA INDUSTRIAL PARK WATER AND SEWER IMPROVEMENTS		SHEET <b>13</b>
SANITARY SEWER STA 95+50 TO STA 102+00 12" WATER MAIN STA WDA12+50 TO STA WDA22+00		



NOTE:  
SEWER SLOPES CALCULATED FROM  
EDGE OF MANHOLE TO EDGE OF MANHOLE

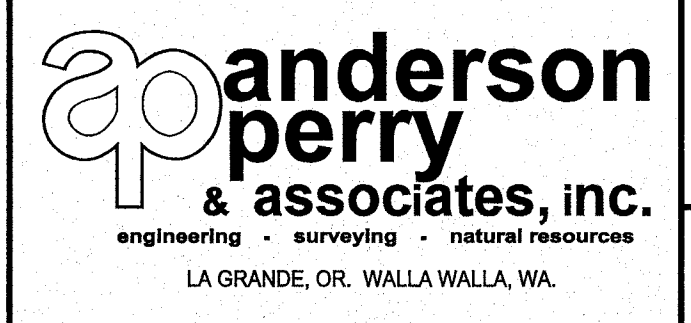
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SANITARY SEWER  
SCALE: 1"=50' HORIZONTAL  
1"=10' VERTICAL



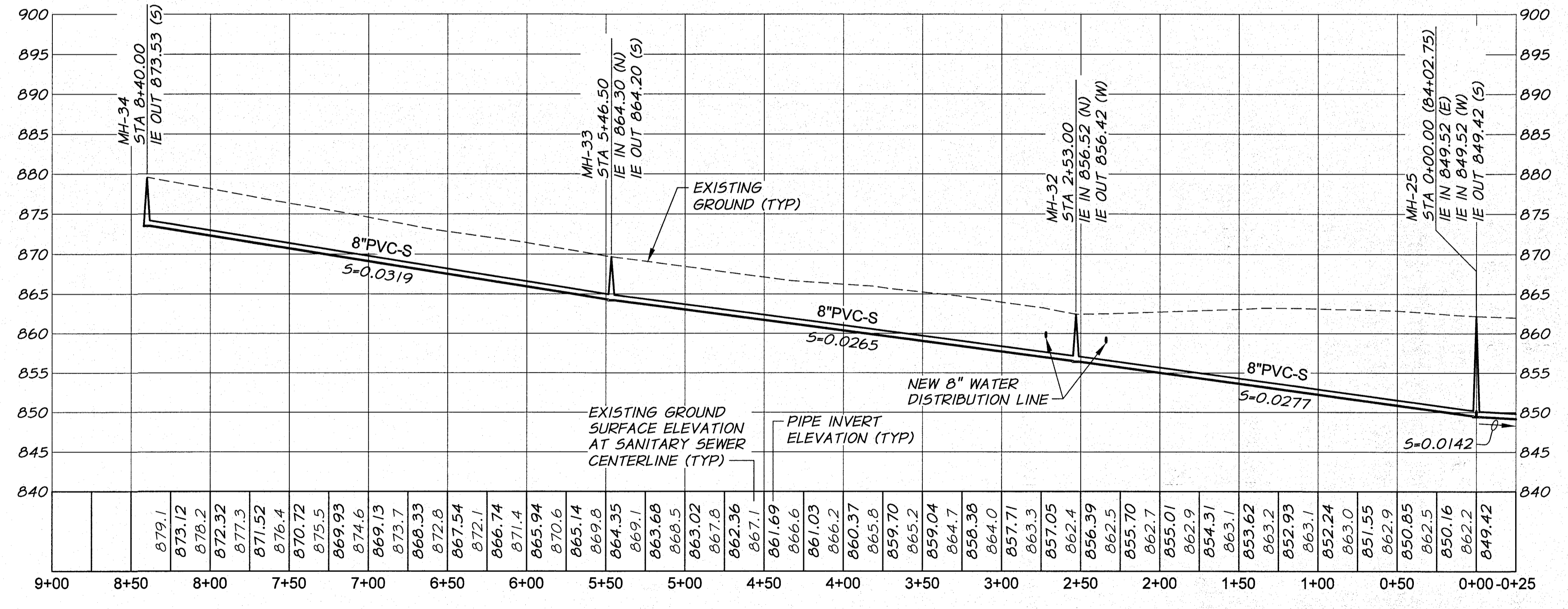
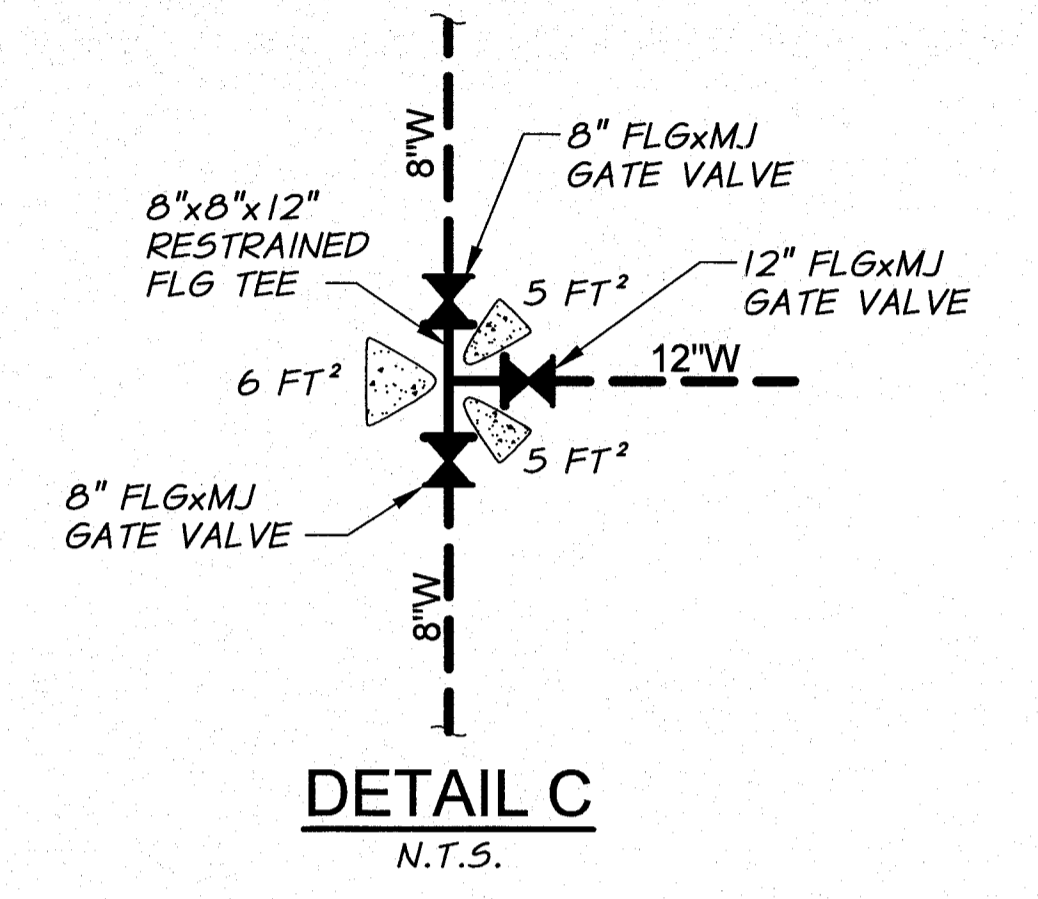
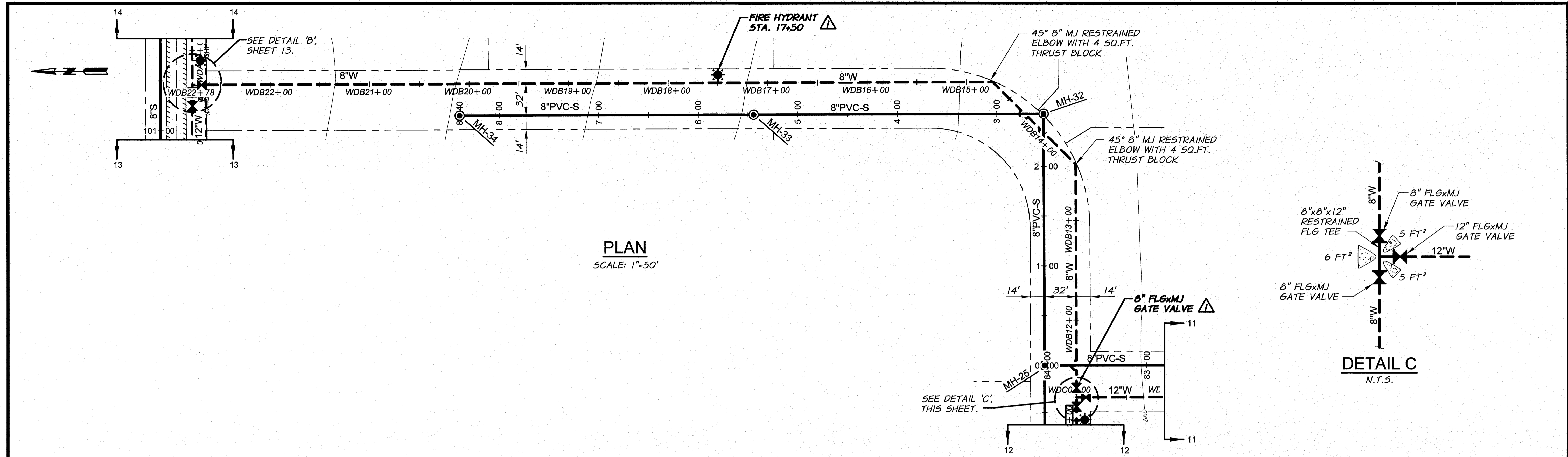
REVISION	BY	DATE
RECORD DRAWINGS	B.B.	12/13
DESIGNED BY	P. BALDNER	
DRAWN BY	E. ARNTZ	
REVIEWED BY	B. BAIRD	

SCALE IN FEET - HORZ	SCALE IN FEET - VERT
1"=50'	1"=10'
JOB NUMBER	DATE
42-63	2012
ACAD FILE	Design9-21 - Arlington Airport.DWG
COPYRIGHT 2013 BY ANDERSON-PERRY & ASSOC., INC.	

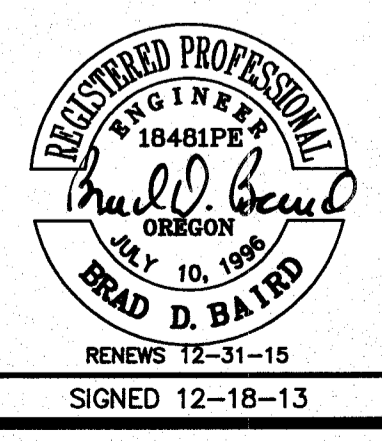
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<p><b>CITY OF ARLINGTON</b> MESA INDUSTRIAL PARK WATER AND SEWER IMPROVEMENTS</p>	<p>SHEET</p>
	<p><b>14</b></p>
<p>SANITARY SEWER STA 102+00 TO STA 110+76 12" WATER MAIN STA WDA0+00 TO STA WDA12+50</p>	



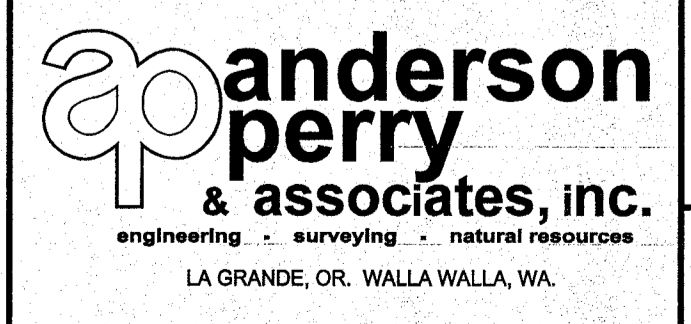
NOTE:  
SEWER SLOPES CALCULATED FROM  
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RECORD DRAWINGS		BY	B.B.	DATE	12/13
DESIGNED BY	P. BALDNER	HORIZ. SCALE	1"=50'	VERT. SCALE	1"=10'
DRAWN BY	E. ARNTZ	JOB NUMBER	42-63	DATE	2012
REVIEWED BY	B. BAIRD	ACAD FILE	Design9-21 - Arlington Airport.DWG	COPYRIGHT 2013 BY ANDERSON-PERRY & ASSOC., INC.	

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**CITY OF ARLINGTON**  
MESA INDUSTRIAL PARK  
WATER AND SEWER IMPROVEMENTS

SANITARY SEWER STA 0+00 TO STA 8+40  
8" WATER DISTRIBUTION LINE  
STA WDB11+50 TO STA WDB22+78

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 PROJECT INFORMATION

- A. Project: POA Flex Building
  - 1. Project Location: 801 Airport RD, Arlington, OR 97812.
- B. Owner: Port of Arlington, 100 Island Park Way, PO Box 279, Arlington, OR 97812
- C. Design Professional of Record: Pillar Consulting Group, Inc., 135 S Main ST, Ste 206, Condon, OR 97823, Jeff Schott P.E.
- D. Contractor: TBD.
- E. The Work generally consists construction of a new 6,000 SF pre-engineered metal building shell with limited interior tenant improvement work and associated site work, utilities and landscaping.
- F. Alternates:
  - 1. (Additive) Provide additional PCC pavement in parking area. Approximately 3,600 SF of 8" PCC pavement
- G. Work by Owner:
  - 1. Plan review fees
- H. Work Under Separate Contracts:
  - 1. N/A
- I. Owner-Furnished Items: The following products will be furnished by Owner and shall be installed by Contractor (OSCI) as part of the Work:
  - 1. Propane tank to be procured and installation coordinate by owner. All piping, pad, and bollards by contractor.
  - 2. Permanent electrical service fee to be paid for by owner. Coordination by contractor. Conduit, meterbase, trenching and backfill by contractor.
  - 3. Permanent telephone connection fee to be paid for by owner. Coordination by contractor. Conduit, meterbase, trenching and backfill by contractor.
  - 4. Water and sewer service connection (including meter fee) fee to City of Arlington to be paid for by owner. Coordination by contractor.
- J. Design services delegated to contractor:
  - a. Pre-engineered metal building

1.2 WORK RESTRICTIONS

- A. Contractor's Use of Premises: During construction, Contractor will have full use of area indicated. Contractor's use of premises is limited only by Owner's right to perform work or employ other contractors on portions of Project and as follows:
1. Owner will occupy the adjacent building during construction. Perform construction normal working hours ( 7AM to 5PM Monday thru Friday, other than holidays), unless otherwise agreed to in advance by Owner or otherwise specified. Clean up work areas and return to usable condition at the end of each work period.
    - a. Provide traffic control as required for work in the public way
  2. Contractor shall minimize impact to adjacent residential properties. No rock hammering prior 8 AM or after 5PM at night. Contractor equipment and employees are not to block adjacent driveways.
  3. Return adjacent areas damage by construction to previous condition.
  4. Provide erosion and sediment control as necessary to prevent sediment run-off from site.
  5. The existing building and south from the north wall of the existing building will be used and occupied by the owner.
- B. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes. No smoking within the building boundary.
- C. Protection of completed work:
1. Concrete slabs and pavement are to be protected and to be delivered to the owner without stains or visible damage. Oil stains or permanent marks will be removed by the contractor, at the contractors expense or the slab section from adjacent construction joints will be removed and replaced by the contractor, at the contractors expense, and withing the project schedule.
  2. Other completed work will be delivered to the owner in good condition without damages or defects. Damaged or defective items will be removed and replaced at the contractor's expense and within the project schedule.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

- A. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
- B. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use forms acceptable to Architect and Owner.
- C. Schedule and conduct progress meetings at Project site at biweekly intervals. Notify Owner and Engineer of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.
  - 1. Record minutes and distribute to everyone concerned, including Owner and Architect.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 2. Submit three copies of each action submittal. Engineer will return two copies.
  - 3. Submit two copies of each informational submittal. Engineer will not return copies.
  - 4. Architect will discard submittals received from sources other than Contractor.
  - 5. In-lieu of paper submittals, Engineer will accept one copy of electronic submittals in PDF format, and will return one copy of submittal in PDF format.
    - a. Samples, color samples and submittals other than cut-sheets or drawings are to be submitted in hard format. Send to:
      - 1) Pillar Consulting Group, Inc., PO Box 704, 135 S Main ST, Suite 206, Condon, OR 97823, Attn: Jeff Schott, P.E.
- B. Place a permanent label or title block on each submittal for identification. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect. Include the following information on the label:
  - 1. Submittal number (sequential)
  - 2. Project name.
  - 3. Date.
  - 4. Name and address of Contractor.
  - 5. Name and address of subcontractor or supplier.

6. Number and title of appropriate Specification Section.
- C. Identify deviations from the Contract Documents on submittals.
- D. Contractor's Construction Schedule Submittal Procedure: Submit two copies of schedule within 15 days after date established for Commencement of the Work. And submit 1 electronic copy in PDF format.

## PART 2 - PRODUCTS

### 2.1 ACTION SUBMITTALS

- A. Product Data: Mark each copy to show applicable products and options. Include the following:
  1. Manufacturer's written recommendations, product specifications, and installation instructions.
  2. Wiring diagrams showing factory-installed wiring.
  3. Printed performance curves and operational range diagrams.
  4. Testing by recognized testing agency.
  5. Compliance with specified standards and requirements.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches. Include the following:
  1. Dimensions and identification of products.
  2. Fabrication and installation drawings and roughing-in and setting diagrams.
  3. Wiring diagrams showing field-installed wiring.
  4. Notation of coordination requirements.
  5. Notation of dimensions established by field measurement.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.
  1. If variation is inherent in material or product, submit at least three sets of paired units that show variations.

### 2.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.



## 2.3 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit (4) four copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## 2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule within 15 days of date established for the Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

## PART 3 - EXECUTION

### 3.1 SUBMITTAL REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Architect will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

### 3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
  - 1. As the Work progresses, indicate Actual Completion percentage for each activity.

013000

- B. Distribute copies of approved schedule to Owner, Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

END OF SECTION 013000

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Testing and inspecting services shall be performed by independent testing agencies.
- B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Architect for a decision.
- C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision.
- D. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 6. Names of individuals making tests and inspections.
  - 7. Description of the Work and test and inspection method.
  - 8. Complete test or inspection data, test and inspection results, an interpretation of test results, and comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 9. Name and signature of laboratory inspector.
  - 10. Recommendations on retesting and reinspecting.
- E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, notices, receipts for fee payments, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.

- G. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- H. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Promptly notify Architect and Contractor of irregularities or deficiencies in the Work observed during performance of its services.
  - 2. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
  - 3. Do not perform any duties of Contractor.
- I. Associated Services: Cooperate with testing agencies and provide reasonable auxiliary services as requested. Provide the following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Security and protection for samples and for testing and inspecting equipment.
- J. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- K. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014000

## SECTION 014200 - REFERENCES

## PART 1 - GENERAL

## 1.1 GENERAL REQUIREMENTS

- A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

## PRIVATE tbl1

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute

AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	Architectural Precast Association
APA	APA - The Engineered Wood Association
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	Association of the Wall and Ceiling Industry
AWCMA	American Window Covering Manufacturers Association

(Now WCMA)

AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association)
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI, Inc.
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
BWF	Badminton World Federation (Formerly: IBF - International Badminton Federation)
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CEA	Consumer Electronics Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CRRC	Cool Roof Rating Council
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association

CRI	Carpet and Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association (Electrostatic Discharge Association)
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA)
FIBA	Federation Internationale de Basketball (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FM Approvals	FM Approvals LLC
FM Global	FM Global (Formerly: FMG - FM Global)
FMRC	Factory Mutual Research (Now FM Global)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association



FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Part of GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation (Now BWF)
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization Available from ANSI

ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA (Now ETL SEMCO)
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association

NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NOMMA	National Ornamental & Miscellaneous Metals Association
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Now ITS)
PCI	Precast/Prestressed Concrete Institute

PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry

SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc. (Now TCNA)
TCNA	Tile Council of North America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTECH	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California

014200

(Now WI)

WMMPA Wood Moulding & Millwork Producers Association

WSRCA Western States Roofing Contractors Association

WWPA Western Wood Products Association

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Use Charges: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated.
- B. Water and Electric Power: Contractor to obtain temporary power and water as required at the contractor's expense.
- C. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. As required

2.2 TEMPORARY FACILITIES

- A. Provide field offices, storage and fabrication sheds, and other support facilities as necessary for construction operations. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove and replaced with permanent filters at end of construction.

## PART 3 - EXECUTION

### 3.1 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary services as required:
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Temporary power to be provided and paid for by contactor. Coordinate with Pacific Power
- C. Temporary data services to be provided and paid for by contractor as required to support field operations.
- D. Temporary water to be coordinated with City of Arlington. Contractor to provide and pay for construction water fees.
- E. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

### 3.2 SUPPORT FACILITIES INSTALLATION

- A. Install project identification and other signs in locations indicated to inform the public and persons seeking entrance to Project.
- B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- C. Recycle waste materials as economically practical. Do not allow debris to accumulate on-site. Contractor to provide waste dumpster(s) as required to collect and contain debris. If the project manager determines the site to require house-keeping, such services may be procured by the owner and deducted from the contactors contract.

### 3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Site security fence may be installed at contractor's discretion. Contractor responsible for security of materials stored on-site and work complete.
- B. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 1200 C Construction General Permit or authorities having jurisdiction, whichever is more stringent.



- D. Furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- G. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise if required due to partial building occupancy.
- H. Install and maintain temporary fire-protection facilities. Comply with NFPA 241.

### 3.4 MOISTURE AND MOLD CONTROL

- A. Before installation of weather barriers, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- B. After installation of weather barriers but before full enclosure and conditioning of building, protect as follows:
  - 1. Do not load or install drywall or porous materials into partially enclosed building.
  - 2. Discard water-damaged and wet material and material that begins to grow mold.
  - 3. Allow installed wet materials adequate time to dry before being enclosed.

### 3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- B. Comparable Product Requests:
  - 1. Submit request for consideration of each comparable product. Do not submit unapproved products on Shop Drawings or other submittals.
  - 2. Identify product to be replaced and show compliance with requirements for comparable product requests. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified.
  - 3. Architect will review the proposed product and notify Contractor of its acceptance or rejection.
- C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.
- D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.
- E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  - 4. Store materials in a manner that will not endanger Project structure.
  - 5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
- F. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. Provide products that comply with the Contract Documents, are undamaged, and are new at the time of installation.
  - 1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
  - 2. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
  - 1. Where Specifications name a single manufacturer and product, provide the named product that complies with requirements.
  - 2. Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
  - 3. Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
  - 4. Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements for "comparable product requests" for consideration of an unnamed product.
  - 5. Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
  - 6. Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements for "comparable product requests" for consideration of an unnamed manufacturer's product.
  - 7. Where Specifications name a single product, or refer to a product indicated on Drawings, as the "basis-of-design," provide the named product. Comply with provisions for "comparable product requests" for consideration of an unnamed product by another manufacturer.
- C. Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
- D. Unless otherwise indicated, Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

## SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 CLOSEOUT SUBMITTALS

- A. Record Drawings: Maintain a set of prints of the Contract Drawings as record Drawings. Mark to show actual installation where installation varies from that shown originally.
  - 1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- B. Operation and Maintenance Data: Submit 2 hard copies and 1 electronic copy in PDF format of manual. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
  - 1. Manufacturer's operation and maintenance documentation.
  - 2. Maintenance and service schedules.
  - 3. Maintenance service contracts.
  - 4. Emergency instructions.
  - 5. Spare parts list.
  - 6. Wiring diagrams.
  - 7. Copies of warranties.

#### 1.2 CLOSEOUT PROCEDURES

- A. Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
  - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  - 2. Advise Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, maintenance service agreements, and similar documents.
  - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Submit record Drawings and Specifications, operation and maintenance manuals, and similar final record information.
  - 6. Deliver tools, spare parts, extra materials, and similar items.
  - 7. Make final changeover of permanent locks and deliver keys to Owner.
  - 8. Complete startup testing of systems.
  - 9. Remove temporary facilities and controls.
  - 10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  - 11. Complete final cleaning requirements, including touchup painting.
  - 12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- B. Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.
- C. Request inspection for Final Completion, once the following are complete:
  - 1. Submit a copy of Substantial Completion inspection list stating that each item has been completed or otherwise resolved for acceptance.
  - 2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- D. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- E. Submit a written request for final inspection for acceptance. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 EXAMINATION AND PREPARATION

- A. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Verify compatibility with and suitability of substrates.
  - 2. Examine roughing-in for mechanical and electrical systems.
  - 3. Examine walls, floors, and roofs for suitable conditions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.
- D. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

### 3.2 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

- A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.
- B. Engage a land surveyor to lay out the Work using accepted surveying practices.

### 3.3 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated. Make vertical work plumb and make horizontal work level.
  - 1. Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections to form hairline joints.
  - 2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 3. Maintain minimum headroom clearance of 84 inches in occupied spaces and 80 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations.
- C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- D. Use products, cleaners, and installation materials that are not considered hazardous.
- E. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

### 3.4 CUTTING AND PATCHING

- A. Provide temporary support of work to be cut. Do not cut structural members or operational elements without prior written approval of Engineer.
- B. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- C. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
  - 1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
  - 2. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

### 3.5 CLEANING

- A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
  - 3. Remove debris from concealed spaces before enclosing the space.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:

1. Remove labels that are not permanent.
2. Clean transparent materials, including mirrors. Remove excess glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
4. Vacuum carpeted surfaces and wax resilient flooring.
5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
6. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

3.6 DEMONSTRATION AND TRAINING

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:

1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 017000

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data concrete mix designs and submittals required by ACI 301.
- B. Ready-Mixed Concrete Producer Qualifications: ASTM C 94/C 94M.
- C. Comply with ACI 301, "Specification for Structural Concrete"; ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"; and CRSI's "Manual of Standard Practice."
- D. See section 321313 Concrete Paving for exterior slabs, sidewalks, ramps and other exterior concrete.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Reinforcing Bars:
  - 1. ASTM A 615/A 615M, **Grade 60**, deformed UNO.
  - 2. ASTM A706 grade 60 where indicated, where welded, and for perimeter elements in special seismic designs.
- B. Plain Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, as drawn, flat sheet.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- E. Portland Cement: ASTM C 150, Type I or II.
- F. Fly Ash: ASTM C 618, Type C or F.
- G. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- H. Silica Fume: ASTM C 1240, amorphous silica.
- I. Aggregates: ASTM C 33, uniformly graded.
- J. Air-Entraining Admixture: ASTM C 260.
- K. Chemical Admixtures: ASTM C 494, high-range water reducing water reducing and accelerating and water reducing and retarding. Do not use calcium chloride or admixtures containing calcium chloride.



- L. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures.
- M. Vapor Retarder: Reinforced sheet, ASTM E 174 5, Class A.
- N. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.
- O. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- P. With approval only:
  - Q. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
  - R. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
  - S. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

## 2.2 MIXES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
  - 1. Minimum Compressive Strength:
    - a. (See )structural drawings for building foundation
    - b. 4,500 psi at 28 days for exterior foundations or exterior exposed concrete
    - c. 4,000 psi at 28 days for slab-on-grade, Strip footings, and thickened edges
    - d. See site paving documents (section 32 13 13)for exterior paving and sidewalks.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.46.
  - 3. Slump Limit: per mix design.
  - 4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of floor slabs to receive troweled finishes to exceed 3 percent.
  - 5. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
  - 6. For concrete exposed to deicing chemicals, limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; silica fume to 10 percent of portland cement by weight.
- C. Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M.
  - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
  - 2. Provide approved retarder where required. Required from GL G to GL H and from GL F to GL G east of ambulance apparatus bay.

## PART 3 - EXECUTION

### 3.1 CONCRETING

- A. Construct formwork according to ACI 301 and maintain tolerances and surface irregularities within ACI 347R limits of Class A, 1/8 inch for concrete exposed to view and Class C, 1/2 inch for other concrete surfaces.
- B. Place vapor retarder on prepared subgrade, with joints lapped 6 inches and sealed.
- C. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- D. Install construction, isolation, and contraction joints where indicated. Install full-depth joint-filler strips at isolation joints.
- E. Place concrete in a continuous operation and consolidate using mechanical vibrating equipment.
- F. Protect concrete from physical damage, premature drying, and reduced strength due to hot or cold weather during mixing, placing, and curing.
- G. Formed Surface Finish: Smooth-formed finish for concrete exposed to view, coated, or covered by waterproofing or other direct-applied material; rough-formed finish elsewhere.
- H. Slab Finishes: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Provide the following finishes:
  - 1. Scratch finish for surfaces to receive mortar setting beds.
  - 2. Float finish for interior steps and ramps and surfaces to receive waterproofing, roofing, or other direct-applied material.
  - 3. Troweled finish for floor surfaces and floors to receive floor coverings, paint, or other thin film-finish coatings.
  - 4. Trowel and fine-broom finish for surfaces to receive thin-set tile.
  - 5. Nonslip-broom finish to exterior concrete platforms, steps, and ramps.
  - 6. Trowel finish for apparatus bay and exposed concrete.
- I. Cure formed surfaces by moist curing for at least seven days. DO NOT use sealers or seal and curing products without approval from EOR AND coordination with flooring requirements.
- J. Begin curing concrete slabs after finishing.
- K. Owner will engage a testing agency to perform field tests and to submit test reports.
- L. Protect concrete from damage. Repair surface defects in formed concrete and slabs.

END OF SECTION 033000

## SECTION 055000 - METAL FABRICATIONS

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings showing details of fabrication and installation.

## PART 2 - PRODUCTS

## 2.1 METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled Steel Floor Plate: ASTM A 786/A 786M.
- E. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.
- F. Steel Pipe: ASTM A 53, standard weight (Schedule 40), black finish.
- G. Slotted Channel Framing: Cold-formed steel channels, 1-5/8 by 1-5/8 inches 0.0677 inch thick, complying with MFMA-3.
- H. Cast Iron: ASTM A 48/A 48M, Class 30.
- I. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- J. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- K. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- L. Deformed bar anchors: ASTM A706 Gr 60.
- M. Headed concrete anchors: Nelson Stud Welding H4L basis of design. Low carbon steel.

## 2.2 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.

## 2.3 FABRICATION

- A. General: Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.
- B. Welding: Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. At exposed connections, finish welds and surfaces smooth with contour of welded surface matching those adjacent.
- C. On units indicated to be cast into concrete or built into masonry, provide welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.
- D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
- E. Fabricate steel pipe columns with 1/2-inch (12-mm) steel base plates and 1/4-inch (6-mm) steel top plates welded to pipe with continuous fillet weld same size as pipe wall thickness. Drill top plates for connection bolts and base plates for 5/8-inch (16-mm) anchor bolts.
- F. Fabricate loose lintels from steel angles and shapes. Size to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm).
- G. Fabricate structural-steel door frames from structural shapes and bars fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops. Plug-weld built-up members and continuously weld exposed joints.
- H. Fabricate window security bars to designs indicated from steel bars and shapes of sizes and profiles indicated. Form steel bars by bending, forging, coping, mitering, and welding with full-length, full-penetration welds. Provide wall brackets, fittings, and anchors to secure units.
- I. Fabricate ladders for locations shown, complying with ANSI A14.3, welded steel construction.
  - 1. For elevator pit ladders, comply with ASME A17.1.
- J. Fabricate pipe bollards from Schedule 40 steel pipe.
- K. Fabricate pipe guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide steel plate, bent to fit flat against the wall or column at ends and to fit around pipe with 2-inch (50-mm) clearance between pipe and pipe guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.

## 2.4 STEEL AND IRON FINISHES

- A. See details for approved paint specifications at exterior locations.
- B. Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning," and paint with a fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack.
- B. Fit exposed connections accurately together to form hairline joints.
- C. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- D. Install pipe guards at exposed vertical pipes where not protected by curbs or other barriers. Install by bolting to wall or column with drilled-in expansion anchors.
- E. Anchor bollards in concrete and fill solidly with concrete, mounding top surface.

END OF SECTION 055000

## SECTION 061000 - ROUGH CARPENTRY

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. Submittals:
  1. ICC-ES evaluation reports for wood-preservative treated wood.
  2. Grade, species, and PT type for lumber

## PART 2 - PRODUCTS

## 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.
- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

## 2.2 TREATED MATERIALS

- A. Preservative-Treated Materials: AWWA UC4B except top plates and wood in contact with masonry at 18" AFF, but not exposed to weather or moisture maybe UC2
  1. Use treatment containing no arsenic or chromium.
  2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
  3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- B. Provide preservative-treated materials as indicated on drawings and as follows:
  1. Wood members in connection with roofing, flashing, vapor barriers, and waterproofing.
  2. Concealed members in contact with masonry or concrete.
  3. Wood framing members that are less than 18 inches (460 mm) above the ground.
  4. Wood floor plates that are installed over concrete slabs-on-grade

## 2.3 LUMBER

- A. Dimension Lumber:
  1. Maximum Moisture Content: 19%.
  2. Non-Load-Bearing Interior Partitions: See drawing
  3. Framing Other Than Non-Load-Bearing Interior Partitions: #2 DFL except as noted for PT maybe HF#2 for plates. See plan for columns & beam species and grade.

4. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

- a. Species: As specified for framing other than non-load-bearing interior partitions.
- b. Grade: #2

B. Timbers 5-Inch Nominal (117-mm Actual) Size and Thicker: DFL#2

1. Maximum Moisture Content: 19 percent.

C. Exposed Boards: Spruce-pine-fir, Select Merchantable or No. 1 Common: NeLMA, NLGA, WCLIB, or WWPA with 19 percent maximum moisture content.

D. Concealed Boards: 19 percent maximum moisture content.

E. Miscellaneous Lumber: #2 grade with 19 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.

## 2.4 MISCELLANEOUS PRODUCTS

A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, in contact with PT lumber or in area of high relative humidity, provide fasteners [with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel as noted.

- 1. Power-Driven Fasteners: CABO NER-272.
- 2. Bolts: Steel bolts complying with ASTM A 307, Grade B with ASTM A 563 hex nuts and, where indicated, flat washers.

B. Metal Framing Anchors: Structural capacity, type, and size indicated.

- 1. Use anchors made from hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 coating designation for interior locations where stainless steel is not indicated.
- 2. Use anchors made from stainless steel complying with ASTM A 666, Type 304 for exterior locations and where indicated.

## 2.5 INSTALLATION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Securely attach rough carpentry to substrates, complying with the following:

- 1. CABO NER-272 for power-driven fasteners.
- 2. Published requirements of metal framing anchor manufacturer.
- 3. Table 2304.9.1, "Fastening Schedule," in the IBC

END OF SECTION 061000

## SECTION 061600 - SHEATHING

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for fire-retardant-treated plywood.

## PART 2 - PRODUCTS

## 2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1.
- B. Oriented Strand Board: DOC PS 2.

## 2.2 TREATED PLYWOOD

- A. Preservative-Treated Plywood: AWPA C9.
  - 1. Use treatment containing no arsenic or chromium.
  - 2. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- B. Provide preservative-treated plywood for items indicated on Drawings.
- C. Fire-Retardant-Treated Plywood: Comply with performance requirements in AWPA C27, labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Use Exterior type for exterior locations and where indicated.
  - 2. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.
  - 3. Use Interior Type A unless otherwise indicated.
  - 4. Identify with appropriate classification marking of a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Provide fire-retardant-treated plywood for items indicated on Drawings.
  - 1. Wall sheathing to 8' in hangar.

## 2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: 3/4" C-C P & T or approved equal
  - 1. Use fire-treated sheathing where noted on drawings.
- B. Gypsum Wall Sheathing: One of the following:
  - 1. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
    - a. Georgia Pacific Dens-Glas Gold or approved



- C. Fiberboard Wall Sheathing: AHA A194.1, Type IV, Grade 1 (Regular), 1/2 inch (13 mm) thick.
- D. Insulating Foam Wall Sheathing: One of the following:
  - 1. Extruded-Polystyrene-Foam Wall Sheathing: ASTM C 578, Type IV.
  - 2. Foil-Faced, Polyisocyanurate-Foam Wall Sheathing: ASTM C 1289, Type I, Class 2. Foam-plastic core and facings shall have flame spread of 25 or less, when tested individually.
- E. Exterior Fiber Cement Sheathing: Fiber cement board complying with ASTM C 1186, Type A, not less than 5/16-inch- (8-mm-) thick.

## 2.4 MISCELLANEOUS PRODUCTS

- A. Fasteners: Size and type indicated.
  - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.
  - 2. Power-Driven Fasteners: CABO NER-272.
- B. Sheathing Joint-and-Penetration Treatment Materials:
  - 1. Sealant for Fiber Cement Sheathing: Joint sealant recommended by sheathing manufacturer for application indicated.
  - 2. Sheathing Tape for Fiber Cement Sheathing: Self-adhering, glass-fiber tape recommended by sheathing and tape manufacturers for application indicated.
  - 3. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.
- C. Adhesives for Field Gluing Panels to Framing: APA AFG-01.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Securely attach to substrates, complying with the following:
  - 1. CABO NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in the IBC.
- B. Fastening Methods:
  - 1. Combination Subfloor-Underlayment:
    - a. Screw to cold-formed metal framing.
  - 2. Wall and Roof Sheathing:
    - a. Screw to cold-formed metal framing or wood framing.

- C. Fiber Cement Sheathing Joint-and-Penetration Treatment: Seal sheathing joints and penetrations according to sheathing manufacturer's written instructions.

END OF SECTION 061600

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, thermal performance test data showing U value in approved configuration per ASTM C-1363 to very compliance with the 2010 Oregon Energy Efficiency Specialty Code.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

- A. Surface-Burning Characteristics: ASTM E 84, and as follows:
  - 1. Flame-Spread Index: 25 or less where exposed; otherwise, as indicated in Part 2 "Insulation Products" Article.
  - 2. Smoked-Developed Index: 450 or less.
- B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV or Type X, with flame-spread index of 75 or less.
- C. Mineral-Fiber-Blanket Insulation: ASTM C 665, Type I, unfaced with fibers manufactured from glass, slag wool, or rock wool, with flame-spread index of 25 or less.
- D. Pre-Engineered Building insulation:
  - 1. Roof: Fabric Liner insulation for metal building roof. Tested per ASTM C-1363 for maximum U value of < 0.039 BTU/SF/F/H.
    - a. Formaldehyde-free fiberglass blanket or batt complying with ASTM C 991 Type 1, ASTM E 136 and ASTM E 84
    - b. Vapor Barrier Liner Fabric: Syseal® type woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene coatings, as follows:
      - 1) Product complies with ASTM C 1136, Types I through Type VI.
      - 2) Perm rating: 0.02 for fabric and for seams in accordance with ASTM E 96.
      - 3) Flame/Smoke Properties:
        - a) 25/50 in accordance with ASTM E 84.07213-4
        - b) Self-extinguishes with field test using matches or butane lighter
      - 4) Color: White
      - 5) Provide R=3.5 thermal blocks per manufacturer.
    - c. Approved systems:
      - 1) Bay Liner FP System by Bay Insulation Systems.
      - 2) Simple Saver System by Thermal Design [www.thermaldesign.com](http://www.thermaldesign.com)

- 3) Approved Equal
2. Wall: Fabric Liner insulation for metal building roof. Tested per ASTM C-1363 for maximum U value of < 0.056 BTU/SF/F/H.
  - a. Formaldehyde-free fiberglass blanket or batt complying with ASTM C 991 Type 1, ASTM E 136 and ASTM E 84
  - b. Vapor Barrier Liner Fabric: Syseal® type woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene coatings, as follows:
    - 1) Product complies with ASTM C 1136, Types I through Type VI.
    - 2) Perm rating: 0.02 for fabric and for seams in accordance with ASTM E 96.
    - 3) Flame/Smoke Properties:
      - a) 25/50 in accordance with ASTM E 84.07213-4
      - b) Self-extinguishes with field test using matches or butane lighter
    - 4) Color: White
    - 5) Provide thermal break per manufacturer on exterior girt face.
  - c. Approved systems:
    - 1) Bay Liner FP System by Bay Insulation Systems.
    - 2) Simple Saver System by Thermal Design [www.thermaldesign.com](http://www.thermaldesign.com)
    - 3) Approved Equal

## 2.2 ACCESSORIES

- A. Vapor Retarder: Polyethylene, **6 mils** thick for batt insulation.
- B. Vapor Barrier Lap Sealant: Solvent-based, Simple Saver polyethylene fabric adhesive.
- C. Vapor Barrier Tape: Double-sided sealant tape 3/4 inch (19 mm) wide by 1/32 inch (.79 mm) thick.
- D. Vapor Barrier Patch Tape: Single-sided, adhesive backed sealant tape 3 inches (76 mm) wide made from same material as Syseal® type liner fabric.
- E. Thermal blocks: Per manufacturer.
- F. Thermal Breaks:
  - a. 3/16 inch (4.7 mm) thick by 3 inch (76 mm) wide white, closed-cell polyethylene foam with pre-applied adhesive film and peel-off backing.
  - b. Polystyrene Snap-R or Quick-stop snap-on thermal blocks.
- G. Straps:
  - a. 100 KSI minimum yield tempered, high-tensile-strength steel.
  - b. Size: Not less than 0.020 inch (0.50 mm) thick by 1 inch (25 mm) by continuous length.
  - c. Galvanized, primed, and painted to match specified finish color on the exposed side.
    - i. Color:

1. White.
  2. Primed and painted to match specified finish color on the exposed side.
- d. g. High-tensile-strength stainless steel.
- H. 10. Fasteners:
- a. For light gage steel: #12 by 3/4 (19 mm) inch plated Tek 2 type screws with sealing washer, painted to match specified color.
  - b. For heavy gage steel: #12 by 1-1/2 inch (38 mm) plated Tek 4 type screws with sealing washer, painted to match specified color.
  - c. c. For wood, concrete, other materials: As recommended by manufacturer.
- I. 11. Wall Insulation Hangers: Fast-R preformed rigid hangers, 32 inch (813 mm) long galvanized steel strips with barbed arrows every 8 inches (203 mm) along its length.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install pre-engineered metal building insulation per manufacture's recommendations.
- B. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.
- C. Except for loose-fill insulation and insulation that is friction fitted in stud cavities, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- D. Place loose-fill insulation to comply with ASTM C 1015.
  1. Comply with the CIMA's Special Report #3, "Standard Practice for Installing Cellulose Insulation."
- E. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage. Locate seams at framing members, overlap, and seal with tape.

END OF SECTION 072100

## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and color Samples.
- B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

### PART 2 - PRODUCTS

#### 2.1 JOINT SEALANTS

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.
- B. Sealant for General Exterior Use Where Another Type Is Not Specified:
  - 1. Single-component, nonsag urethane sealant, ASTM C 920, Type S; Grade NS; Class 25; and for Use NT.
- C. Sealant for Exterior Traffic-Bearing Joints, Where Slope Precludes Use of Pourable Sealant:
  - 1. Single-component, nonsag urethane sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use T.
- D. Sealant for Exterior Traffic-Bearing Joints, Where Slope Allows Use of Pourable Sealant:
  - 1. Single-component, pourable urethane sealant, ASTM C 920, Type S; Grade P; Class 25; for Use T.
- E. Sealant for Use in Interior Joints in Ceramic Tile and Other Hard Surfaces in Kitchens and Toilet Rooms and Around Plumbing Fixtures:
  - 1. Single-component, mildew-resistant silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT; formulated with fungicide.
- F. Sealant for Interior Use at Perimeters of Door and Window Frames:
  - 1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
- G. Acoustical Sealant:

1. Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission as demonstrated by testing according to ASTM E 90.

## 2.2 MISCELLANEOUS MATERIALS

- A. Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.
- D. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with ASTM C 1193.
- B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 Available products

- A. Doors:
  - 1. Submit for approval
- B. Exterior Frames, fire rated door frames, and where indicated:
  - 1. Approved welded metal frame.
- C. Interior frames:
  - 1. Timely standard frame TA 8, series C where noted
  - 2. Approved welded metal frames where noted
  - 3. Approved equal

2.2 MATERIALS

- A. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M, suitable for exposed applications.
- B. Hot-Rolled Steel Sheets: ASTM A 1011/A 1011M, free of scale, pitting, or surface defects.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G60 or A60.
- D. Frame Anchors: ASTM A 591/A 591M, 40Z coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.3 HOLLOW METAL DOORS AND FRAMES

- A. Fire-Rated Doors and Frames: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10C.



1. Where indicated, provide doors that have a temperature rise rating of 450 deg F.
- B. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.
- C. Doors: Complying with ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level indicated, 1-3/4 inches thick unless otherwise indicated.
  1. Interior Doors: Level 1 and Physical Performance Level C (Standard Duty),.
  2. Exterior Doors: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush), metallic-coated steel sheet faces.
    - a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363. Max U value <0.24 BTU/(h\*degF\*SF)
  3. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as door face sheets.
- D. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.
  1. Steel Sheet Thickness for Interior Doors: 0.053 inch.
  2. Steel Sheet Thickness for Exterior Doors: 0.067 inch.
  3. Fabricate interior frames with mitered or coped corners knocked down for field assembly.
  4. Fabricate exterior frames from metallic-coated steel sheet, with mitered or coped and continuously welded corners.
  5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
  6. Frame Anchors: Not less than 0.042 inch thick.
- E. Glazing Stops: Nonremovable stops on outside of exterior doors and on secure side of interior doors; screw-applied, removable, glazing stops on inside, fabricated from same material as door face sheet in which they are installed.
- F. Door Louvers: Sight proof per SDI 111C.
  1. Fire-Rated Automatic Louvers: Actuated by fusible links and listed and labeled.
- G. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.
- H. Grout Guards: Provide where mortar might obstruct hardware operation.
- I. Prepare doors and frames to receive mortised and concealed hardware according to ANSI A250.6 and ANSI A115 Series standards.
- J. Reinforce doors and frames to receive surface-applied hardware.
- K. Finish:
  1. Doors and exterior & fire-door welded frame:
    - a. Manufacturer's standard, factory-applied coat of lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria.

081113

- b. Field paint.
- 2. Interior knock-down frames:
  - a. Manufacturer standard finish: Timely Browntone or approved equal

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install hollow metal frames to comply with ANSI/SDI A250.11.
  - 1. Fire-Rated Frames: Install according to NFPA 80.
- B. Install doors to provide clearances between doors and frames as indicated in ANSI/SDI A250.11.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying rust-inhibitive primer. Use galvanizing repair paint for metallic coated surfaces.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

1. Submittals: Door schedule
2. Material submittal/sample
3. Finish sample
4. Door louver samples

PART 2 - PRODUCTS

2.1 DOOR CONSTRUCTION, GENERAL

- A. Quality Standard: WDMA I.S.1-A.
- B. WDMA I.S.1-A Performance Grade:
  1. Heavy Duty unless otherwise indicated.
- C. Solid Core PC-5 or PC-7
- D. Particleboard-Core Doors: Provide blocking in particleboard cores or provide structural composite lumber cores instead of particleboard cores for doors with exit devices or protection plates.

2.2 FLUSH WOOD DOORS

- A. Doors for Transparent Finish:
  1. Interior Solid-Core Doors: Custom grade, five or seven-ply, particleboard cores.
    - a. Faces: Grade A rotary-cut select white birch.
    - b. Veneer Matching: Slip and running match.
    - c. Pair matching.
    - d. Continuous matching for doors with transoms.

2.3 LOUVERS AND LIGHT FRAMES

- A. Louvers: Factory-painted steel louvers or Dark bronze anodized aluminum louvers.
- B. Light Frames: Wood beads of species compatible with door faces.

## 081416 Flush Wood Doors

### 2.4 FABRICATION AND FINISHING

- A. Factory fit doors to suit frame-opening sizes indicated and to comply with clearances specified.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3.
- C. Cut and trim openings to comply with referenced standards.
  - 1. Trim light openings with moldings indicated.
  - 2. Factory install glazing in doors indicated to be factory finished.
  - 3. Factory install louvers in prepared openings.
- D. Factory finish doors indicated for transparent finish with manufacturer's standard finish complying with WDMA TR-6, catalyzed polyurethane for grade specified for doors.
  - 1. Sheen: Satin.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install doors to comply with manufacturer's written instructions and WDMA I.S.1-A, and as indicated.
  - 1. Install fire-rated doors to comply with NFPA 80.
- B. Align and fit doors in frames with uniform clearances and bevels. Machine doors for hardware. Seal cut surfaces after fitting and machining.
- C. Clearances: As follows unless otherwise indicated:
  - 1. 1/8 inch at heads, jambs, and between pairs of doors.
  - 2. 1/8 inch from bottom of door to top of decorative floor finish or covering.
  - 3. 1/4 inch from bottom of door to top of threshold.
  - 4. Comply with NFPA 80 for fire-rated doors.
- D. Repair, refinish, or replace factory-finished doors damaged during installation, as directed by Architect.

END OF SECTION 081416

SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 SECTIONAL OVERHEAD DOORS

- A. Products:
  - 1. Cloplay 3200 series (basis of design)
  - 2. Overhead Door
  - 3. Other approved.
- B. Standard for Sectional Doors: Comply with DASMA 102 unless otherwise indicated.
- C. Structural Performance, Exterior Doors: Provide doors capable of withstanding 25 lbf/SF wind-loading pressure.
- D. Panels: Galvanized steel with grooved, ribbed, or fluted face sheets 0.023 inch (24 gauge) exterior / 0.015" (28 gauge) interior thickness.
  - 1. Provide insulated panels with galvanized-steel inside faces.
  - 2. Insulation: Polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84; or glass-fiber board insulation.
    - a.  $U < 0.46$  for assembled door
  - 3. Finish: Baked enamel or powder coat.
- E. Glazed Panel Inserts: Lo-E glass, clear, 3mm insulated units w/safety glazing.
  - 1. Insulated tempered glass, full section panels. Bottom of panel at approximately 4' AFF
- F. Operation:
  - 1. Electrical.
    - a. Trolley-type electric operator..
      - 1) Lift master MT basis of design.
      - 2) Provide interior up/down/stop operating pad.
      - 3) Provide (2) remote controls per door, unique to each door. One button operation.
      - 4) Provide sensing edge
      - 5) Provide photo-eye sensors (CPS-UN-4 water-tight or approved equal)

- 6) Provide jack-shaft connection for future door operator
- 7) Provide automatic close (i.e: no constant contact to close)
- 2. Manual doors:
  - a. Manual chianer hoist operator with jack-shaft conection for overhead doors without overhead operators
  
- G. Tracks and Supports: Galvanized steel, sized for door size and weight.
- H. Hardware: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- I. Locks: Spring-loaded dead bolt operable from inside only.
- J. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
- K. Obstruction Detection Device: Equip motorized door with external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
- L. Provide weather strips at bottom and all door edges.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install door, track, and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports.
- B. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- C. Fasten vertical track assembly to framing at not less than **24 inches** o.c. Hang horizontal track from structural overhead framing with angle or channel hangers. Provide bracing and reinforcement as required for rigid installation of track and door.
- D. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and fitting weathertight for entire perimeter.
- E. Test and adjust controls and safeties.

END OF SECTION 083613

## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Allowances: Provide hardware under Hardware Allowance in Division 01 Section "Price and Payment Procedures."
- B. Submittals: Hardware schedule and keying schedule.
- C. Deliver keys to Owner.
- D. Fire-Resistance-Rated Assemblies: Provide products that comply with NFPA 80 and are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for applications indicated. On exit devices provide label indicating "Fire Exit Hardware."

### PART 2 - PRODUCTS

#### 2.1 HARDWARE

- A. Available Manufacturers:
  - 1. Locksets & Latchsets, cylindrical:
    - a. Key-pad units: Alarm Lock Trilogy DL2700-WP
    - b. Hager 3500 series, (grade 2), Withnell operating trim
  - 2. Locksets & latchsets, Mortice
    - a. Hager 3800 series, grade 1, Withnell operating trim on off-side
  - 3. Exit Devices:
    - a. Hager 4500 Series, Rim or Mortise Lock, w/45 series exterior trim w/Withnell operating trim.
  - 4. Door Closer:
    - a. Interior doors: Hager 5400 series, Grade 2
    - b. Exterior doors: Hager 5200 series, Grade 1
    - c. Approved equal
- B. Hinges:
  - 1. Stainless-steel hinges with stainless-steel pins for exterior.
  - 2. Nonremovable hinge pins for exterior and public interior exposure.
  - 3. Ball-bearing hinges for doors with closers and entry doors.
  - 4. 2 hinges for ~~1-3/8-inch~~ thick wood doors.
  - 5. 3 hinges for ~~1-3/4-inch~~ thick doors **90 inches** or less in height; 4 hinges for doors more than **90 inches** in height.
- C. Locksets and Latchsets:

1. BHMA A156.2, Series 4000, Grade 2 for bored locks and latches. Grade 1 for key-pad units
  2. BHMA A156.3, Grade 1 for exit devices.
  3. BHMA A156.5, Grade 2 for auxiliary locks.
  4. BHMA A156.12, Series 5000, Grade 1 for interconnected locks and latches.
  5. BHMA A156.13, Series 1000, Grade 1 for mortise locks and latches.
  6. Lever handles on locksets and latchsets, Falcon Quantum.
  7. Provide trim on exit devices matching locksets.
- D. Key locks to Owner's existing master-key system.
1. Cylinders with six-pin tumblers. Schlage C keyway
  2. Provide construction keying.
  3. Provide key control system, including cabinet.
- E. Closers:
1. Mount closers on interior side (room side) of door opening. Provide regular-arm, parallel-arm, or top-jamb-mounted closers as necessary.
  2. Adjustable delayed opening (accessible to people with disabilities) feature on closers.
- F. Provide wall stops or floor stops for doors indicated and at all doors closers.
- G. Provide hardware finishes as follows:
1. Hinges: Matching finish of lockset/latchset.
  2. Locksets, Latchsets, and Exit Devices: Satin Stainless steel plated
    - a. General: ANSI 626/ US26D
    - b. Knobs & push bars: ANSI 630/US32D
  3. Closers: Matching finish of lockset/latchset.
  4. Other Hardware: Matching finish of lockset/latchset.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Mount hardware in locations recommended by the Door and Hardware Institute unless otherwise indicated.

### 3.2 HARDWARE SCHEDULE

1. See Drawings

END OF SECTION 087100



SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and 12" sample
- B. Fire-Resistance-Rated Assemblies: Provide products that comply with NFPA 80 and are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for applications indicated.
- C. Safety Glass: Category I or II materials complying with testing requirements in 16 CFR 1201.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated.
  - 1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
  - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
  - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
  - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- E. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction and the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- F. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
- G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3.

- C. Reflective-Coated Glass: ASTM C 1376, coated by pyrolytic process.
- D. Patterned Glass: ASTM C 1036, Type II, Class 1 (clear), Form 3; Quality-Q6.
- E. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II, Class 1 (clear), Form 3; Quality-Q6.
- F. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials.
- G. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

## 2.2 GLASS TYPES:

### A. EXTERIOR GLAZING:

1. Design for minimum 30 PSF wind load .

### B. SAFETY GLAZING

1. Safety glazing meeting 2010 OSSC chapter 24 requirements is required in the following locations:
  - a. Swinging doors.
  - b. Glazing adjacent to swinging doors with 24" of the edge of the door in the closed position.
  - c. Other hazardous locations identified in section 2406.4
2. Safety glazing to meet and be marked "CPSC16 CFR 1201" or "ANSI Z97.1" as applicable.
3. Safety glazing to be category set forth by CPSC 16 CFR 1201
  - a. Category I for panes in doors < 9SF or <9 SF adjacent to a door (within 24")
  - b. Category II for panes over 9SF requiring safety glazing.

### C. INULATING GLASS UNITS:

1. Low-E
2. Maximum U value of assembled window: 0.46 BTU/(SF\*H\*degF)
3. Maximum SHGC of assembly: 0.40
4. Exterior lite:
  - a. Heat strengthened float glass or fully tempered float glass
  - b. Tint: grey
  - c. Min. 4mm thickness
5. Interior lite:
  - a. Heat strengthened float glass or fully tempered float glass
  - b. Min. 4mm thickness
6. Provide in exterior doors where shown
7. Provide at all exterior windows
8. Provide tempered safety glass where required in other sections and per Building Code.

088000

### 2.3 FIRE-PROTECTION-RATED GLAZING TYPES

- A. Glass Type : 45-minute fire-rated glazing; ~~5/16-inch~~ thick, fire-protection-rated, laminated ceramic glazing.

### 2.4 GLAZING SEALANTS

- A. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
- B. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are contained in GANA's "Glazing Manual."
- B. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- C. Remove nonpermanent labels, and clean surfaces immediately after installation.

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Glazing Publications: Comply with the following published recommendations:
  - 1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
  - 2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- C. Safety Glazing Products: For film-backed, laminated, or tempered mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Glass Mirrors, General: ASTM C 1503.
- B. Clear Glass: Mirror Glazing Quality, 4.0-mm nominal thickness.
- C. Tempered Clear Glass: Mirror Glazing Quality, for blemish requirements; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied; 4.0-mm nominal thickness.
- D. Laminated Mirrors: ASTM C 1172, Kind LM.
  - 1. Clear Glass for Outer Lite: Mirror Glazing Quality, 4.0-mm nominal thickness.
- E. Mirror Mastic: An adhesive setting compound, asbestos free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
- F. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.
- G. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

H. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of each mirror in a single piece.

1. Finish: Clear bright anodized.

## 2.2 FABRICATION

A. Mirror Edge Treatment: Flat polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

B. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Provide a minimum air space of **1/8 inch** between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

B. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed so heads do not impose point loads on backs of mirrors.

1. Top and Bottom Aluminum J-Channels: Provide setting blocks **1/8 inch** thick by **4 inches** long at quarter points.
2. Mirror Clips: Place a felt or plastic pad between mirror and each clip. Locate clips so they are symmetrically placed and evenly spaced.
3. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.

C. Remove nonpermanent labels, and clean surfaces immediately after installation.

END OF SECTION 088300

## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

#### 2.2 PANEL PRODUCTS

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Interior Gypsum Board: ASTM C 36/C 36M or ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Type X. Sag-resistant type for ceiling surfaces. 5/8" min thickness U.N.O.
- C. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M or ASTM C 1396/C 1396M, in thickness indicated. Regular type unless otherwise indicated Type X, 5/8" thick U.N.O.
- D. Cementitious Backer Units: ANSI A118.9.

#### 2.3 ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.
  - 1. Provide cornerbead at outside corners unless otherwise indicated.
  - 2. Provide LC-bead (J-bead) at exposed panel edges.
  - 3. Provide control joints where indicated.
- B. Aluminum Accessories: Extruded-aluminum accessories indicated with manufacturer's standard corrosion-resistant primer.

- C. Joint-Treatment Materials: ASTM C 475/C 475M.
  - 1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
  - 2. Joint Compounds: Setting-type taping compound and drying-type, ready-mixed, compounds for topping.
  - 3. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.
  - 4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.
- D. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.
- E. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install gypsum board to comply with ASTM C 840.
  - 1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
  - 2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
  - 3. Multilayer Fastening Methods: Fasten base layers and face layer separately to supports with screws.
- B. Install cementitious backer units to comply with ANSI A108.11.
- C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.
- D. Finishing Gypsum Board: ASTM C 840.
  - 1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
  - 2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
  - 3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
  - 4. Where indicated, provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface.
- E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.
- F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

- G. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

END OF SECTION 092900



SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
- B. Extra Materials: Deliver to Owner at least 20 linear feet of each type and color of resilient wall base installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE VCB

- A. Products:
  - 1. Johnsonite wall base.
- B. Color and Pattern: Wall base, 4", traditional w/toe profile; color: select from manufacture standard colors
- C. ASTM F 1861, Type TP (rubber, thermoplastic).
- D. Group (Manufacturing Method): I (solid).
- E. Style: Cove (base with toe).
- F. Minimum Thickness: 0.125 inch.
- G. Height: 4 inches.
- H. Lengths: coils in manufacturer's standard lengths.
- I. Outside Corners: preformed.
- J. Inside Corners: Job formed.
- K. Finish: Low luster.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement- or blended hydraulic cement-based formulation provided or approved by flooring manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by manufacturer to suit products and substrate conditions.
- C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Prepare concrete substrates according to ASTM F 710. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- B. Adhesively install resilient wall base and accessories.
- C. Install wall base in maximum lengths possible. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required.
- D. Install stair-tread-nose filler to nosing substrates that do not conform to tread contours.
- E. Install reducer strips at edges of floor coverings that would otherwise be exposed.
- F. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
  - 1. Apply two coat(s).

END OF SECTION 096513

SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Paint exposed surfaces,
  - 1. New interior GWB, Plywood surfaces.
  - 2. New exterior metal fabrication other than pre-engineered metal.
  - 3. Interior and exterior handrails and fabrications.
  - 4. New hollow metal doors and hollow metal frames (other than pre-finished Timely type frames)
  - 5. New wood doors other than those factory finished
  - 6. Caulk door jambs as required.
  - 7. Parking stripping on rigid or flexible pavement
  
- B. Submittals:
  - 1. Product Data.
  - 2. Samples- drawdowns.
  - 3. Color samples for owner selection
  
- C. MPI Standards:
  - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
  
- D. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed.
  
- E. Extra Materials: Deliver to Owner 1 gal. of each color and type of finish coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

- A. Products:
  - 1. Sherwin Williams
  - 2. Benjamin Moore

3. Carboline
4. Other approved

B. Products:

1. Exterior Primer:
  - a. General: 100% Acrylic Latex primer meeting MPR #6, 17, & 39
  - b. Stain blocking primer: Sealing over knots, or pockets: Alkyd primer meeting MPI #5 & 45 F, VOC compliant.
  - c. Metal primer: Approved Exterior water-based primer (Sherwin Williams Pro Industrial Pro-Cryl Primer or approved)
2. Exterior Paint:
  - a. Body: 100% acrylic latex meeting TT-P-001984. Finish: flat. Minimum solids content 40%
  - b. Trim: 100% acrylic latex meeting TT-P-19-D. Finish: semi-glass. Minimum solids content 40%.
  - c. Metal:
    - 1) Intermediate coat: S-W A100 Exterior Latex Gloss or approved equal
    - 2) Top coat: S-W A100 Exterior Latex Gloss or approved equal
3. Interior primer
  - a. General: 100% Acrylic Latex primer meeting MPR #6, 17, & 39
  - b. Metal: Approved water based system. (Sherwin Williams Pro Industrial Pro-Cryl Primer or approved)
  - c.
4. Interior paint
  - a. Acrylic Latex meeting TT-P-2119
  - b. 2-coats for plywood. Approved Waterborne Acrylic Satin finish. (S-W ProClassic Waterborne Acrylic Satin enamel, B20 Series or approved)

C. Material Compatibility: Provide materials that are compatible with one another and with substrates.

1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

D. Colors: To be selected by owner.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.

- C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

### 3.2 APPLICATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Paint exposed surface (see summary above) unless otherwise indicated.
  - 1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
  - 2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint the back side of access panels.
  - 4. Color-code mechanical piping in accessible ceiling spaces.
  - 5. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.
- C. Apply paints according to manufacturer's written instructions.
  - 1. Use brushes only for exterior painting and where the use of other applicators is not practical.
  - 2. Use rollers for finish coat on interior walls and ceilings.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  - 1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. Apply stains and transparent finishes to produce surface films without color irregularity, cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other imperfections. Use multiple coats to produce a smooth surface film of even luster.

### 3.3 EXTERIOR PAINT APPLICATION SCHEDULE

- A. Steel:
  - 1. Gloss enamel: Primer coat, intermediate coat, and top coat per manufacture's (Carboline or approved) specifications.
    - a. Bollards: Safety yellow or approved by owner.
- B. Galvanized Metal:
  - 1. Gloss Latex: Two coats over galvanized-metal primer per manufacturer recommendations.: MPI EXT 5.3A.
- C. Aluminum:
  - 1. Flat Latex: Two coats over quick-drying primer for aluminum: MPI EXT 5.4H.
- D. Dressed Lumber: Including .

1. Wood trim & wood doors: Semi gloss Latex: Two coats over primer: MPI EXT 6.3L. Minimum film thickness per manufacture's recommendation.

E. Wood Panel Products: Including siding, facia, soffits, battens, or non-accent trim

1. Flat Latex: Two coats over primer: MPI EXT 6.4K. Minimum film thickness per manufacture recommendations.

### 3.4 INTERIOR PAINT APPLICATION SCHEDULE

A. Steel:

1. Semigloss Latex: Two coats over alkyd anticorrosive primer or factory primer primer: MPI INT 5.1Q.

B. Dressed Lumber: Including architectural woodwork, cabinets, doors & trim

1. Satin Polyurethane: Two coats over stain: MPI INT 6.3E.

C. Gypsum Board:

1. Latex. Two coats over primer/sealer: MPI INT 9.2A. See drawings for sheen
2. All interior paint to be applied by roller or sprayed and back-rolled.

D. Wood Panel Products: Including plywood siding.

1. Flat or Satin Latex: Two coats over primer: MPI EXT 6.4K.

END OF SECTION 099100

## SECTION 101400 - SIGNAGE

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and Samples.
  - 1. Submit full-size rubbings for metal plaques.
  - 2. Submit submittal for plastic or acrylic restroom signs
- B. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. Aluminum Castings: Alloy recommended by sign manufacturer for casting process used and for use and finish indicated.
- B. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy and temper recommended by aluminum producer and finisher, with not less than the strength and durability of 5005-H15.
- C. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by aluminum producer and finisher, with not less than the strength and durability properties of 6063-T5.
- D. Bronze Castings: ASTM B 584, Alloy UNS C83600 (No. 1 manganese bronze).
- E. Bronze Plate: ASTM B 36/B 36M, alloy UNS No. C28000 (muntz metal).
- F. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304.
- G. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- H. Plastic Laminate: High-pressure laminate engraving stock with face and core in contrasting colors.
- I. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of **3 mils (0.076 mm)** with pressure-sensitive adhesive backing, suitable for exterior applications.

## 2.2 SIGNS

- A. Interior Panel Signs: Engraved plastic laminate or Matte-finished opaque acrylic with adhesively applied vinyl film copy with square-cut edges and rounded corners.
  - 1. Finishes and Colors: As selected from manufacturer's full range
  - 2. Tactile Characters: Characters and Grade 2 Braille raised **1/32 inch (0.8 mm)** above surface with contrasting colors.
  - 3. Provide signs for all rooms mounted on the wall beside the room door. Show framed panel sign details on Drawings.
  - 4. Provide Men, Women, or Unisex restroom signs as required at restrooms
- B. Exterior Signs: ADA parking signs
  - 1. Standard metal exterior signs meeting current ODOT guidelines.

## PART 3 - EXECUTION

### 3.1 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. Two-Face Tape: Mount signs to smooth, nonporous surfaces, other than vinyl.
  - 2. Hook-and-Loop Tapes: Mount signs to smooth, nonporous surfaces.
  - 3. Magnetic Tape: Mount signs to smooth, nonporous surfaces.
  - 4. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
  - 5. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes.

END OF SECTION 101400



## SECTION 104416 - FIRE EXTINGUISHERS

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

### PART 2 - PRODUCTS

#### 2.1 FIRE EXTINGUISHERS AND BRACKETS

- A. Portable Fire Extinguishers: NFPA 10, listed and labeled for the type, rating, and classification of extinguisher.
  - 1. Products:
    - a. Submit.
  - 2. Multipurpose Dry-Chemical Type: See Occupancy Plan
- B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for fire extinguishers indicated, with plated or baked-enamel finish.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install mounting brackets in locations indicated at heights acceptable to authorities having jurisdiction.
- B. Install fire extinguishers in mounting brackets where indicated.

END OF SECTION 104416

SECTION 133419 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data Samples Shop Drawings structural analysis data signed and sealed by a qualified professional engineer registered in the state where Project is located and material test reports.
  - 1. Submit (4) copies of design drawings and calculations sealed by licensed engineer in State of Oregon.
  - 2. Submit standard colors for exterior siding, roof and trim for review
- B. Comply with AISC 360, "Specification for Structural Steel Buildings," and with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- C. Warranty: Minimum 20 year color warranty on siding and roofing in addition to other standard warranty's required by other sections.
- D. Special Inspection: Metal Building supplier to be approved shop for special inspection as set forth in 2014 OSSC section 1704.2.5.2 OR the manufacture shall reimburse the owner for third-party special inspection services provided at the expense of the owner associated with the metal building fabrication as required per 2014 OSSC section 1705.2.

PART 2 - PRODUCTS

2.1 METAL BUILDINGS

- A. Manufacturers:
  - 1. Butler
  - 2. Varco Pruden
  - 3. Pacific Building Systems
  - 4. Star
  - 5. Behlen
  - 6. Metallic
  - 7. Nucor Building Systems

B. Metal Building System Description: Rigid clear span with Lean-to on right end-wall

1. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings.
2. Dimensions and Bay Spacings: As indicated on Drawings.
3. Roof Slope: As indicated on drawing.
4. END WALLS
  - a. Left endwall may be a rigid frame or post & beam endwall system with cross bracing.
  - b. Right endwall is to be a rigid moment frame with removable wind post to allow for expansion into future building. Frame need only support current building.
  - c. Sidewalls may be cross-braced as shown IF a 3-0 7-0 mandoor can fit under the framing without obstruction.
5. Building – Note that this is a Partially Enclosed Building
6. Metal building supplier to include (4) additional man-door framing assemblies to allow future man-doors to be cut into building side or endwalls. Girt at 4' to be sized to allow for cut-in of future door.
7. Provide framing and blocking as required for door and louver penetrations.

C. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses according to procedures in MBMA's "Metal Building Systems Manual":

1. Design Loads: As indicated on Drawings.
2. Note that this is a Risk Category II building
3. Site Class D
4. Design Loads: ASCE/SEI 7-2010, and 2014 Oregon Structural Specialty Code..

D. Structural-Framing Materials:

1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70.
7. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80, or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80; with G60 coating designation; mill phosphatized.
8. Steel Joists and Joist Girders: Comply with SJI's "Standard Specifications, Load Tables, and Weight Tables for Steel Joists and Joist Girders," with steel-angle top and bottom chord members.

9. All structural and secondary framing to be galvanized or primed with manufacture's standard primer. Min. 1 mil thickness.

E. Roof and Wall Panels:

1. Metal Panels: Steel sheet, zinc coated by the hot-dip process, complying with ASTM A 653/A 653M, **G90**, Structural Steel (SS), and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
2. Standing seam roof: Ribbed Roof Panels: Metal panels factory formed to provide **24-inch** coverage; with **3-inch**- high (including seam), raised trapezoidal major ribs at panel edges, and intermediate stiffening ribs symmetrically spaced between major ribs. Single or double-folded, mechanically seamed panels.
3. Roof Panel Metal Thickness: 0.024 inch (24 gauge).
4. Lap-Seam Wall Panels: Metal panels factory formed to provide **36-inch** coverage, with raised trapezoidal major ribs at **12 inches** o.c., and intermediate stiffening ribs symmetrically spaced between major ribs. Design panels for mechanical attachment to structure using exposed fasteners, lapping major ribs at panel edges.
5. Wall Panel Metal Thickness: 0.018 inch (26 gauge).
6. Metal Panel Finish:
  - a. ROOF: Fluoropolymer two-coat system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight, with a total minimum dry film thickness of **1 mil**.
    - 1) To be colored panel off-white or gray. Must have low reflectance
  - b. WALL & TRIM: Siliconized-polyester system consisting of epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil** for primer and **0.8 mil (0.02 mm)** for topcoat
    - 1) Color to be selected by owner during submittal process
7. Panel Accessories: Provide clips, flashings, sealants, gaskets, and similar items. Where roof panels attach directly to purlins, provide **R-3**, extruded-polystyrene thermal spacer blocks.

F. Flashing and Trim: Form from **0.022-inch** nominal-thickness, zinc-coated (galvanized) steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim same as adjacent roof or wall panels.

G. Gutters and Downspouts: Form from **0.022-inch** nominal-thickness, zinc-coated (galvanized) steel sheet prepainted with coil coating. Match gutters to profile of gable trim and finish gutters to match roof fascia and rake trim. Finish downspouts to match wall panels.

H. Metal Building Insulation: See insulation specification section

1. Vapor-Retarder Facing: Fiber-reinforced white polypropylene or vinyl film complying with ASTM C 1136.

I. Accessories:

1. Personnel Doors: See door schedule
2. Overhead doors: See door schedule
3. Louvers: Coordinate with mechanical

J. Miscellaneous Materials:

1. Grout: ASTM C 1107, factory-packaged, nonmetallic grout, noncorrosive, and nonstaining.
2. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing; of manufacturer's standard size.
3. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

PART 3 - EXECUTION

3.1 ERECTION

- A. Setting Base and Bearing Plates: Clean concrete and masonry of bond-reducing materials and roughen surfaces before setting plates. Clean bottom surface of plates.
1. Set plates for structural members on wedges, shims, or setting nuts.
  2. Tighten anchor rods after supported members have been positioned and plumbed.
  3. Pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
- B. Erect framing true to line, level, plumb, rigid, and secure. Comply with AISC specifications referenced in this Section.
1. Make field connections for primary framing using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts," snug tightened or pretensioned.
  2. Fasten secondary framing to primary framing using clips and non-high-strength bolts. Hold rigidly to a straight line by sag rods.
  3. Install joists, girders, and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications, Load Tables, and Weight Tables for Steel Joists and Joist Girders."
  4. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
  5. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- C. Roof Panel Installation: Provide roof panels of full length from eave to ridge when possible.
1. Install screws with power tools having controlled torque to compress neoprene washer without damage to washer, screw threads, or panels. Install screws in predrilled holes.
  2. Use aluminum or stainless-steel fasteners for exterior and galvanized fasteners for interior.
  3. Locate panel splices over, but not attached to, structural supports; stagger panel splices.
  4. Standing-Seam Roof Panels: Fasten to purlins with concealed clips at each standing-seam joint. Install clips over top of insulation. Crimp standing seams with manufacturer-approved motorized seamer tool. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction.

5. Lap-Seam Roof Panels: Fasten to purlins with exposed fasteners at each lapped joint. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on lap seams. At splices, lap panels **6 inches**, seal with butyl sealant and fasten together with interlocking clamping plates.
- D. Wall Panel Installation: Provide panels full height of building unless otherwise indicated.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints.
  2. When two rows of panels are required, lap panels **4 inches** minimum. Locate panel splices over structural supports.
  3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
  4. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing.
  5. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on lap seams.
  6. Install screws with power tools having controlled torque to compress neoprene washer without damage to washer, screw threads, or panels. Install screws in pre-drilled holes.
  7. Use aluminum or stainless-steel fasteners for exterior and galvanized fasteners for interior.
- E. Translucent Panel Installation: Attach plastic panels to structural framing with end laps of not less than **6 inches** for roof panels and **4 inches** for wall panels and side laps of not less than **1-1/2 inches**. Seal with translucent mastic.
- F. Insulation Installation: Install insulation concurrently with panel installation. Set vapor-retarder-faced units with vapor retarder to warm side of construction. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
1. Over-Framing Installation: Extend over and perpendicular to top flange of secondary framing members. Hold in place by panels fastened to secondary framing.
  2. Between-Purlin Installation: Extend between purlins. Carry facing up and over purlin, overlapping adjoining facing. Hold in place with bands and crossbands below insulation.
  3. Over-Purlin-with-Spacer-Block Installation: Extend over and perpendicular to top flange of secondary framing members. Install layer of unfaced insulation over first layer to fill space formed by roof panel standoffs. Hold in place by panels fastened to standoffs.
  4. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend between purlins. Carry facing up and over purlin, overlapping adjoining facing. Install layer of unfaced insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
- G. Accessory Installation:
1. Seal perimeter of door window and louver frames with elastomeric sealant used for panels.
  2. Install personnel doors and frames straight, level, and plumb. Securely anchor frames to building structure. Set units with maximum **1/8-inch** clearance between door and frame at jambs and head and maximum **3/4-inch** clearance between door and floor.

## 133419- Pre-Engineered Metal Building

3. Sliding Service Door Installation: Bolt support angles to opening head members. Bolt door tracks to support angles at maximum 24 inches o.c. Set doors and operating equipment with necessary hardware, stops, and continuous hood flashing.
  4. Install windows level, plumb, and true to line, without warp or rack, anchored securely in place. Set sill members in a bed of sealant and seal perimeter of each unit.
  5. Pipe Flashing: Form flashing around pipe penetrations. Fasten and seal to panels.
  6. Adjust and check each operating item of hardware to ensure proper operation and function. Replace units that cannot be adjusted to operate freely and smoothly.
- H. Gutters, Downspouts, Flashing, and Trim Installation: Comply with SMACNA's "Architectural Sheet Metal Manual." Provide for thermal expansion; conceal fasteners where possible, and set units true to line and level. Install work with laps and seams that will be permanently watertight.

END OF SECTION 133419

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. The provisions of the General Requirements, Supplementary Requirements, and Division 1 apply to the plumbing work specified in this Division.
- B. The requirements of this Section apply to the plumbing systems specified in these Specifications and in other Division 22 sections.
- C. Provide all items, articles, materials, equipment, operations and/or methods listed, mentioned, shown and/or scheduled on the Drawings and/or in these Specifications, including all labor, supervision, services, permits, fees, and incidentals necessary and required to provide a complete and operable facility with complete systems as shown, specified, and required by applicable codes.
- D. The work shall include, but not be limited to, the following systems:
  - 1. Water, sanitary sewer, and storm sewer service complete per serving utility company requirements.
  - 2. Service and distribution piping including valves, supports, insulation, etc.
  - 3. Complete plumbing systems, including fixtures, trim, equipment, etc.
  - 4. Rough-in and final connection of plumbing equipment and fixtures furnished under other Divisions of this Specification.
  - 5. Piping to and connection of equipment or fixtures furnished outside of these Specifications and Contract but described on the Drawings.
  - 6. Special systems as specified herein.
- E. Advise subcontractor, suppliers, and vendors involved in the work specified in this Section of the applicable requirements.

### 1.2 QUALITY ASSURANCE

- A. All work and materials shall conform to all applicable local and state codes and all federal, state and other applicable laws and regulations. All clarifications and modifications which have been cleared with appropriate authorities are listed under the applicable sections. All electrical products shall bear the label of a recognized testing laboratory such as UL or CSA.
- B. Whenever the requirements of the Specifications or Drawings exceed those of the applicable code or standard, the requirements of the Specifications and Drawings shall govern.
- C. Codes and Standards: Comply with the provisions of the following referenced codes, standards and specifications:
  - 1. Federal Specifications (FS)
  - 2. American National Standards Institute (ANSI)
  - 3. National Electrical Manufacturer's Association (NEMA)
  - 4. National Fire Protection Association (NFPA)
  - 5. Underwriters Laboratories, Inc. (UL)
  - 6. Factory Mutual (FM)



7. International Building Code (IBC) with State and Local Amendments
  8. International Mechanical Code (IMC) with State and Local Amendments
  9. Uniform Plumbing Code (UPC) with State and Local Amendments
  10. American Society for Testing and Materials (ASTM)
  11. Americans with Disabilities Act (ADA)
  12. International Fire Code (IFC) with State and Local Amendments
  13. Energy Policy Act (EPAct)
  14. Manufacturers Standardization Society (MSS)
  15. National Sanitation Foundation (NSF)
  16. American Gas Association (AGA)
- D. Each piece of equipment furnished shall meet all detailed requirements of the Drawings and Specifications and shall be suitable for the installation shown. Equipment not meeting all requirements will not be acceptable, even though specified by name. Where two or more units of the same class of equipment are furnished, use product of the same manufacturer; component parts of the entire system need not be products of same manufacturer. Furnish all materials and equipment, new and free from defect and of size, make, type and quality herein specified or approved by the Architect. All materials shall be installed in a neat and professional manner.
- E. All apparatus shall be built and installed to deliver its full rated capacity at the efficiency for which it was designed.
- F. The Drawings and Specifications are complementary. What is called for by one shall be as though called for by both.
- G. Drawings: Do not scale drawings for roughing-in measurements, nor use as shop drawings. Make field measurements and prepare shop drawings as required. Coordinate work with shop drawings of other specification divisions.
- H. Field Wiring: It is the intent of these specifications that all systems shall be completed and operable. Refer to all drawings and specifications, especially the electrical drawings, to determine voltage, phase, circuit ampacity and number of connections provided. Provide all necessary field wiring and devices from the point of connection indicated on the electrical drawings. All equipment shall be installed in compliance with the Electrical Code and the equipment's UL listing. Bring to the attention of the Architect in writing, all conflicts, incompatibilities, and/or discrepancies prior to bid or as soon as discovered.

### 1.3 WORK OF OTHER CONTRACTS

- A. Work under this contract shall be conducted in a manner to allow for the future installations of such equipment or items listed in other sections of this Specification.

### 1.4 WORK OF OTHER DIVISIONS

- A. Work under this Division shall be conducted in a manner to cooperate with the installation of such equipment or items as specified in other Divisions.

- B. HVAC piping systems, fuel piping systems, fire suppression piping systems, and control devices and control wiring relating to the heating and air conditioning systems are specified under other Divisions of these Specifications except for provisions or items specifically noted on the Drawings or specified herein.
- C. Consult all Drawings and Specifications in this project and become familiar with all equipment to be installed. Coordinate all aspects of the construction with the other trades on the job to ensure that all work and materials required to provide a complete and operational facility are included in the bid.
- D. All sections of Division 22 are interrelated and shall be considered in their entirety when interpreting any material, method, or direction listed in any section of Division 22. Individual sections are not written for specific subcontractors or suppliers but for the general contractor.

1.5 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES (SUBMITTALS)

- A. Submit in accordance with Division 1 full technical and descriptive shop drawing data on proposed materials and equipment as detailed in each section.
- B. The Contractor shall verify that all equipment submitted can be delivered and installed within the time constraints of the construction period.
- C. Include the manufacturer, type, style, catalog number, complete specification, certified dimensions, provided options or accessories, and description of physical appearance for each item and option submitted. Reproduction of catalog data sheets shall be clean and legible to show all details, including gauge of metal used.
- D. Include only information on exact equipment to be installed, not general catalogs of the manufacturer. Where sheets show proposed equipment as well as other equipment, identify proposed equipment with arrow or similar concise method.
- E. Submit with each copy a transmittal letter verifying that all included equipment submittals have been carefully considered for quality, dimensions, function, and have been coordinated with the Drawings and Specifications. Guarantee that proposed materials will meet or exceed the quality and function of those specified.
- F. Include field wiring diagrams and connection diagrams for all control and/or low voltage systems, including floor plans.
- G. Submittal Review: The submittal review process is a means to provide quality control. The action noted to be taken (or where conflicts with the contract documents are not noted) shall not be interpreted by the Contractor as automatic "change orders." Approval of the data for substitution and shop drawings shall not eliminate the contractor's responsibility for compliance with Drawings or Specifications, nor shall it eliminate the responsibility for freedom from errors of any sort in the data discovered prior to or after the review process. Deviations, discrepancies, and conflicts between the submittals and the Contract Documents shall be called to the Architect's attention in writing at the time of transmittal of the data.

- H. Unless otherwise directed by Division 1, submittal data shall be in a 3-ring plastic binder with a clear plastic sleeve and a project identification sheet inserted. Arrange submittals numerically with specification sections identified on divider tabs. All required division 22 sections shall be submitted at one time.

#### 1.6 PRODUCT SUBSTITUTION

- A. Materials other than those specified may be approved for this project providing a written request is submitted to the Architect prior to bid in accordance with Instructions to Bidders. Requests shall include complete specifications, dimensions, manufacturer and catalog number for each item for which approval is desired. If, in the opinion of the Architect, the material is not complete or if it is not an acceptable substitute, he may reject it. The Architect's evaluation will be based solely on the material submitted.

#### 1.7 CHANGE ORDERS

- A. All supplemental cost proposals by the Contractor shall be accompanied by a complete itemized breakdown of labor and materials without exception. At the Architect's request, the contractor's estimating sheets for the supplemental cost proposals shall be made available to the Architect. Labor must be separated and allocated for each item of work.

#### 1.8 RECORD DOCUMENTS

- A. Project Record (As-Installed) Drawings:
  - 1. Maintain a set of record drawings on the job site as directed in Division 1.
  - 2. Keep Drawings clean, undamaged, and up to date.
  - 3. Record and accurately indicate the following:
    - a. Depths, sizes, and locations of all buried and concealed piping and all cleanouts, whether concealed or exposed, dimensioned from permanent building features.
    - b. Locations of all valves with assigned tag numbers.
    - c. Changes, additions, and revisions due to change orders, obstructions, etc. Eradicate extraneous information.
    - d. Locations of tracer wire terminal points.
    - e. Model numbers of installed equipment.
  - 4. Make Drawings available when requested by Architect for review.
  - 5. Submit as part of the required Project Closeout documents. Final submittal will be in the form of reproducible drawings.
  - 6. Quality of entire set of project record drawings to match the quality of the contract documents; quality to be judged by Architect. Computer-aided design drafting (CADD) shall be used to complete project record drawings. Use standards set in contract documents. Note field modifications, all addenda and change order items on project record drawings. If deficiencies are found in either the quality or the accuracy of the drawings, they will be returned unapproved. Additional review of subsequent submissions shall be at the contractor's expense.

- B. Operating and Maintenance Manuals: Submit five (5) sets of Operating and Maintenance Instructions, including manufacturer's service data, wiring diagrams, and parts lists and vendors for all serviceable items of equipment, valve charts, balancing data, final control diagrams showing final set points, and any additional equipment added by change order, bound in three-ring, vinyl or canvas covered, loose-leaf binders organized with index and thumb-tab markers for each classification of equipment or data. Comply with provisions of Section 01700 where applicable to the mechanical work.
- C. Instruction Manual: Submit separate Instruction Manual [30] days prior to scheduling the required Instruction Period. Include the following:
  - 1. Description of each system and operational sequences.
  - 2. Seasonal system adjustments.
  - 3. Description and normal settings for time clocks, thermostats, fan and other motor switches, etc.
  - 4. Normal valve settings.
  - 5. Emergency measures upon system failure.
  - 6. Cross reference information furnished by manufacturer in the Operating and Maintenance Manual above.

## 1.9 WARRANTY

- A. Furnish, prior to application for final payment, three copies of written and signed guarantee effective a period of one year from date of completion and acceptance of entire project; agree to correct, repair and/or replace defective materials and/or equipment or the results of defective workmanship without additional expense to the Owner. Where no response satisfactory to the Owner has occurred within three working days from the written report of a warranty covered defect, the contractor shall agree to pay for the cost of repair of the reported defect by a contractor of the Owner's choice.
- B. Where the manufacturer's guarantee exceeds one year, the longer guarantee shall govern and include the Contractor's labor.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. General: Provide all new materials and equipment, identical to apparatus or equipment in successful operation for a minimum of two years. Provide materials of comparable quality omitted here but necessary to complete the work. Maximum allowable variation from stated capacities, minus 5% to plus 10% as approved in each case.
- B. Compatibility: Provide products which are compatible with other portions of the work and provide products with the proper or correct power and fuel-burning characteristics, and similar adaptations for the project.
- C. Efficiency: Service (Domestic) Water Heating Equipment shall comply with ASHRAE Standard 90.1-2001 and the State Energy code. Where equipment efficiencies are indicated, the use of alternate or substitute manufacturer's equipment with lower efficiencies is not permitted.

- D. Lead Content: Potable water piping, fittings, and valves not limited to faucets, mixing valves, or pressure reducing valves shall not exceed federal standards for lead content.
- E. Storage and Handling:
  - 1. Delivery: Deliver to project site with manufacturer's labels intact and legible.
  - 2. Handling: Avoid damage.
  - 3. Storage: Inside protected from weather, dirt and construction dust. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping.

## 2.2 MOTORS

- A. General: Motors shall conform to UL, CSA, and NEMA MG-1 and bear a permanently attached nameplate indicating compliance and motor characteristics. Provide motors meeting UL 507 standard where applicable.
- B. Manufacturers: General Electric, Lincoln, Baldor, Wagner, Westinghouse or accepted substitute. Where selection of motor manufacturer is within Contractor's control (independent of equipment selection), provide motors produced by a single manufacturer to the greatest extent possible.
- C. Temperature Rating: Class B insulation, except where otherwise indicated or required for service indicated.
- D. Starting Capability: As required for service indicated, but not less than 5 starts per hour.
- E. Phases and Current: 1/3 horsepower and smaller capacitor-start, capacitor-run single-phase; 1/2 horsepower and larger, squirrel-cage induction polyphase. Coordinate with actual current characteristics; specified in Division 16 and use no 230/460 voltage motors on 208 voltage power or vice versa.
- F. Service Factor: 1.15 for polyphase; 1.25 for single-phase.
- G. Construction: General purpose, continuous duty; NEMA design "B", except "C" for high starting torque applications.
- H. Frames: For single phase motor sizes NEMA No. 48, except 56 for heavy-duty applications. NEMA "T" frames for 1 horsepower and larger polyphase motors. Special frame types as required for close coupled pumps and similar applications.
- I. Bearings: Ball or roller, and design for thrust where applicable; double shielded and regreasable, except provide permanently sealed where not accessible for greasing. Sleeve-type bearings permitted only where indicated for fractional (1/6 hp or less) horsepower motors with direct drive loads. Minimum L-10 bearing life of 40,000 hours when used with minimum pitch sheaves per NEMA Table 14-1.

- J. Enclosure Type: Unless otherwise indicated, open drip-proof for normal concealed indoor use, guarded where exposed to employees or occupants. Type II for outdoor use, except weather-protected Type I where adequately housed. Totally enclosed where explosion-proof motors are required.
- K. Overload Protection: Built-in thermal with internal sensing device for stopping motor, and for signaling where indicated on single phase motors.
- L. Speed: Not faster than synchronous speeds of 1800 RPM except on some pumps as approved in each case.
- M. Efficiency: The manufacturer's highest (NEMA premium) efficiency motors tested under procedures recommended by NEMA MG-1 (IEEE Standard 112, Test Method B). Intermittent duty motors, operating less than 6 hours per day, shall comply with EPAct/EISA standards. Submit manufacturer's data if motor nameplate does not indicate minimum efficiency. Nominal full load efficiencies for 460 volt, 1800 rpm motors:

<u>HP</u>	<u>Efficiency %</u>
1-1/2	87.5
2	89.5
3	89.5
5	89.5
7-1/2	91.0
10	91.7
15	93.0
20	93.0
25	93.6

- N. Inverter Duty Motors: Where motors are controlled by an adjustable frequency drive, provide motors labeled "Inverter Duty," complying with NEMA MG1-31, and meeting the requirements of the adjustable frequency drive manufacturer.

### 2.3 STARTERS AND SWITCHES

- A. Manufacturers: General Electric, ITE, Allen Bradley, Square D, Cutler-Hammer, Cerus Industrial or accepted substitute. Provide starters by same manufacturer throughout project.
- B. General: Provide each motor with starter or switch as approved and recommended by manufacturer of motor or equipment of which motor is a part.
- C. Starter Characteristics: Type I general purpose enclosure with padlock ears and supports for mounting as indicated. Starter type and size as recommended by motor manufacturer. Use no starter smaller than NEMA Size 1.
- D. Manual Switches: Provide on motors 1/3 horsepower and smaller except where automatic control or interlock is indicated. Include pilot light. Provide overload protection where not protected by internal motor overload protection.

- E. Magnetic Starters: Provide for 1/2 horsepower and larger motors, and for smaller motors on automatic control or with interlock switch. Full voltage, across the line, single speed, non-reversing except where otherwise required. Include power on and running pilot lights, on-off-auto selector switch, external reset button, overload relay on each phase, and devices for coordination with control system (including fused transformer for control circuit). Provide automatic ambient temperature compensation for starter heaters.

#### 2.4 GUARDS

- A. Provide guards in accordance with State Safety Code and OSHA requirements over all rotating equipment including belts, shafts and couplings. Drive guards over belts and sheaves shall include 2-1/2" diameter access opening at shaft ends for speed counter.

#### 2.5 ACCESS PANELS

- A. Manufacturers: Inryco/Milcor, Bilco, Elmdor, Karp, Potter-Roemer or accepted substitute. Inryco/Milcor Style DW, K, or M panels as required by construction.
- B. Construction: Flush style, fire rated in fire rated partitions and ceilings. Screwdriver latches on all access panels.

#### 2.6 EXPANSION JOINTS AND LOOPS

- A. Flexible Expansion/Seismic Loop: Factory fabricated assembly consisting of two 90 degree elbows, two lengths of flexible hose, and a 180 degree return bend to allow free movement in 3 axis. Return bend shall include attachment point for support and a drain/vent fitting. Hose shall be corrugated metal style with metal overbraid. Connections to match piping system except connection 2" and larger shall be flanged style. Copper or bronze construction for potable water systems. Metraflex "Metraloop."

#### 2.7 METERS AND GAUGES

- A. General: Install meters and gauges where shown on the plans or specified elsewhere in these specifications.
- B. Pressure-Temperature Test Plugs:
  - 1. 1/4" or 1/2" NPT fitting of solid brass capable of receiving either an 1/8" OD pressure or temperature probe and rated for zero leakage from vacuum to 1000 psig. Neoprene valve core for temperatures to 200 deg. F., Nordel to 350 deg. F.
  - 2. Provide for each test plug a pressure gauge adapter with 1/16" or 1/8" OD pressure probe.
  - 3. Furnish a test kit containing one 2-1/2" dial pressure test gauge of suitable range, one gauge adapter with 1/16" or 1/8" OD probe and two 5" stem pocket test thermometers – one 0 to 220 degrees F and one 50 to 550 degrees F. Turn the kit over to the Architect.
  - 4. Cisco "P/T Plugs," Peterson "Pete's Plug" or approved substitute.

- C. Thermometers: Liquid-in-glass, adjustable stem, separable sockets, plus 40 to 240 degrees F range (unless indicated otherwise). Weiss numbers are listed. Equivalent Taylor, Trerice, Weksler or approved substitute.
  - 1. Wide case (9") in equipment rooms and all major equipment items. Weiss "9VS" series.
  - 2. Narrow case (7") in all other locations. Weiss "7VS" series.
- D. Pressure Gauges: Install on discharge of all pumps and where shown on Drawings 4-1/2" dial, 0-100 psig graduation pressure gauges with Ashcroft No. 1106 pulsation dampers and stop cocks. Weiss UGE-1 or equivalent Ashcroft, Marsh, Trerice, Weksler.

## 2.8 VALVES

- A. General: Provide factory fabricated valves of the type, body material, temperature and pressure class, and service indicated. Bronze gate, globe and check valves shall comply with MSS-SP-80. Ball valves shall comply with MSS-SP-110. Iron gate and globe valves shall comply with MSS-SP-70. Iron check valves shall comply with MSS-SP-71. Butterfly valves shall comply with MSS-SP-67. Valve size same as connecting pipe size.
- B. Acceptable Manufacturers: Milwaukee, Crane, Grinnell, Nibco, Hammond, Stockham, Legend, Watts, Apollo, Webstone, and Walworth. Grooved end valves Victaulic, Tyco-Grinnell, Gruvlock, or accepted substitute. NIBCO numbers are given except as noted. Where possible, provide valves from a single manufacturer.
- C. Valve styles: Domestic hot and cold water.
  - 1. Valves 2" and Smaller:
    - a. Ball: Two-piece, bronze body, full port, 600 psi WOG, Fig. T/S-585-70.
    - b. Check: Bronze body, swing check, 200 psi WOG, T/S-413B (bronze disc) or T/S-413Y (Teflon disc).
    - c. Globe (shutoff): Bronze body, Teflon disc, 200 psi WOG, T/S-211Y.
    - d. Globe (throttling): Bronze body, full stainless steel plug disc, 600 psi WOG, T-276AP.
  - 2. Valves 2" through 12":
    - a. Ball: Three-piece, bronze body, full port, 600 psi WOG, T/S-595Y.
    - b. Butterfly: Ductile iron body, aluminum bronze disc, 200 psi WOG, Lugged body – LD-2000, Wafer body – WD-2000, Grooved body – GD-4765.
    - c. Gate (to 3"): Bronze body, non-rising stem, 200 psi WOG, T/S-133.
    - d. Gate (4" to 12"): Iron body, bronze trim, non-rising stem, solid wedge, bolted bonnet, 200 psi WOG, F-619.
    - e. Check (2 1/2" and larger): Iron body, bronze trim, Class 125, F-918-B (swing type).



- D. Butterfly Valve Operators: Locking lever for shut-off service; "Memory Stop" for lever handle with 10 position throttling plate for throttling service; gear operator with babbitt sprocket rim for chain-operated valves and gear operators on all 8" or larger valves.
- E. Butterfly Valve Style: Lug-type with cap screws for all valves utilized for equipment isolation for servicing. Lug and grooved style valves shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full system pressure.
- F. Insulated Valves: Install extended-stem valves in all piping specified as insulated, and arrange in the proper manner to receive insulation.
- G. Multifunction Valves: Valves incorporating multiple functions including strainers, drain valves with retained caps, air vent valves, P/T ports, unions, pump flanges, check valves, and balancing valves are acceptable. Webstone,
- H. Mechanical Actuators: Provide mechanical actuators with chain operators where indicated, where valves 4" and larger are mounted more than 7' above the floor, and where manual operation is difficult because of valve size, pressure differential or other operating conditions. Drop chains to 6'-6" above the floor.
- I. Selection of Valve Ends (Pipe Connections): Select and install valves with ends matching the types of pipe/tube connections.

## 2.9 HANGERS AND SUPPORTS

- A. General: Provide factory-fabricated horizontal piping hangers, clamps, hanger rod, inserts, supports, etc., of the indicated MSS type and size. The Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry Practice SP-58 and SP-69 are referenced in this section.
- B. Manufacturers: B-Line, Grinnell, Anvil, Superstrut, Tolco, Erico, or accepted substitute. Grinnell figure numbers in parentheses where applicable (or other manufacturers as noted).
- C. Corrosion Protection: Provide materials which are zinc plated or factory painted to prevent corrosion. Prevent electrolysis in the support of copper tubing by the use of hangers and supports which are copper plated, plastic coated, or by other recognized industry methods.
- D. Seismic Requirements: Provide seismic restraints in accordance with OSSC Section 1613. Design restraint systems in accordance with "Seismic Restraint Manual: Guidelines for Mechanical Systems," Second Edition, 1998, SMACNA, or "A Practical Guide to Seismic Restraint" ASHRAE RP-812, 1999.
- E. Horizontal Piping Hangers and Supports:
  - 1. Adjustable Clevis Hanger: MSS Type 1 (Fig. 260).
  - 2. Adjustable Band Hanger: MSS Type 7 (Fig. 97), fabricated from steel.
  - 3. Adjustable Swivel-Band Hanger: MSS Type 10 (Fig. 70).
  - 4. Clamp: MSS Type 4 (Fig. 212, 216).
  - 5. Double-Bolt Clamp: MSS Type 3 (Fig. 295A, 295H), including pipe spacers.

6. Adjustable Saddle-Support: MSS Type 36 (Fig. 258) and MSS Type 37 (Fig. 259), including saddle, pipe and reducer. Fabricate base-support from steel pipe and include cast-iron flange or welded-steel plate.
7. Channel Support System: Galvanized, 12 gauge channel and bracket support systems, single or double channel as indicated on the Drawings or as required by piping and equipment weights. Grinnell "Power Strut" channel. Acceptable Manufacturers: Super Strut, Globestrut, Bee, Kindorf or Unistrut.

F. Vertical Pipe Clamps:

1. Two-Bolt Riser Clamp: MSS Type 8 (Fig. 261).
2. Four-Bolt Riser Clamp: MSS Type 42 include pipe spacers at inner bolt-holes.

G. Hanger Attachment:

1. Hanger Rod: Rolled threads, zinc plated. Right hand threaded.
2. Turnbuckles: MSS Type 13 (Fig. 230).
3. Weldless Eye-Nut: MSS Type 17 (Fig. 290).
4. Malleable Eye-Socket: MSS Type 16 (Fig. 110R).
5. Clevises: MSS Type 14 (Fig. 299).

H. Building Attachments:

1. Concrete Inserts: MSS Type 18 (Fig. 282), steel or Grinnell Power-Strut PS349 continuous channel. Acceptable Manufacturers: Michigan Hanger, Globestrut, Unistrut, Super Strut.
2. Clamps: MSS Type 19 (Fig. 285, 281), Type 20, 21 (Fig. 225, 226, 131), Type 23 (Fig. 86, 87, 88), Type 25 (Fig. 227), Type 27 through 30 where applicable.

## 2.10 IDENTIFICATION MARKERS

A. Pipe Markers:

1. Adhesive pipe markers of width, letter size and background color conforming to ANSI A13.1.
2. Acceptable Manufacturers: Brady B946 with arrow banding tape or similar Seaton, Zeston, MSI.

B. Nameplates:

1. Engraved nameplates, 1/16" thick, laminated 2-ply plastic, bottom ply white, outer ply black, letters formed by exposing bottom ply.
2. Size: 2" by 4" nameplates with 1/4" high letters.

C. Valve Tags:

1. 2" diameter, 18-gauge polished brass tags with 3/16" chain hole and 1/4" high stamped, black-filled service designation.
2. Acceptable Manufacturers: Seaton, Brady, MSI.

## 2.11 CONCRETE FOR MECHANICAL WORK

- A. Classes and Applications: Provide strength classes with the following cement content and water/cement ratios for the indicated applications and similar required applications:
1. 4000 psi Class: 565 pounds cement/yard (6.0 sacks); 0.57 water/cement ratio. Provide 4000 Class for tanks, vaults, beam-type foundations and similar structures.
  2. 3000 psi Class: 500 pounds cement/yard (5.25 sacks); 0.68 water/cement ratio. Provide 3000 Class for miscellaneous underground structural concrete, reinforced encasement, block type foundations (with smallest dimension at least 0.2 times largest dimension), curbs, pads, inertia blocks (unframed type), and similar structural support work.
  3. 2500 psi Class: 450 pounds cement/yard (4.75 sacks); 0.75 water/cement ratio. Provide 2500 Class for plain encasement, thrust blocks, filling steel-framed units, and similar work.
  4. Rough Grouting Class: 565 pounds cement/yard (6.0 sacks); 0.75 water-cement ratio; adjust aggregate sizes to facilitate placement. Use for rough grouting, not for setting equipment bases.
  5. Backfill Class (Lean Concrete): 375 pounds cement/yard (4.0 sacks); 0.87 water/cement ratio. Use for backfilling where excavations are extended below point of support for mechanical work.

## 2.12 PENETRATION FIRE STOPPING

- A. Through-penetration fire stopping system tested and listed by Underwriters Laboratories. 3M, Metacaulk, SpecSeal, or approved.
- B. Select system for proper application based on wall construction, type of penetrating item, wall rating, etc.

## PART 3 - EXECUTION

### 3.1 LAYOUT AND COORDINATION

- A. Site Examination: Before starting work, carefully examine site and all contract Drawings. Become thoroughly familiar with conditions governing work on this project. Verify all indicated elevations, building measurements, roughing-in dimensions and equipment locations before proceeding with any of the work.
- B. Utility Locations: The location of existing utilities, wires, conduits, pipes, ducts, or other service facilities are shown in a general way only on the Drawings and are taken from existing records. Ascertain whether any additional facilities other than those shown on the plans may be present and determine the exact location and elevations of all utilities prior to commencing installation.
- C. Sleeves, Inserts, Cast-in-Place Work: Provide sleeves, inserts, anchoring devices, cast-in-place work, etc. which must be set in concrete sequenced at the proper time for the project schedule.

- D. Coordination:
1. The drawings are based on equipment of a certain manufacturer and may be identified as such. Where alternate manufacturers or approved substitutes are incorporated into the work, any required design changes are the responsibility of the contractor. Such changes may include changes in utility or system connection sizes, location, or orientation, service clearances, structural support or acoustic considerations.
  2. Where the work must be sequenced and positioned with precision in order to fit into the available space, prepare accurate scale shop drawings showing the actual physical dimensions required for the installation and submit prior to purchase/fabrication/installation of any of the elements involved in the coordination.
  3. Cooperate with other trades in furnishing material and information for sleeves, bucks, chases, mountings, backing, foundations and wiring required for installation of mechanical items.
  4. Coordinate all work with other trades and determine in advance where interfacing of the mechanical work and other work are required to be connected together. Provide all materials and equipment to make those connections. Submit shop drawings showing required connections where special conditions exist.
- E. Discrepancies: Report immediately any error, conflict or discrepancy in Plans, Specifications and/or existing conditions. Do not proceed with any questionable items of work until clarification of same has been made. Should rearrangement or re-routing of piping be necessary, provide for approval the simplest layout possible for that particular portion of the work.

### 3.2 UTILITY COORDINATION

- A. Utility Coordination: Coordinate all aspects of the incoming plumbing utility services indicated with the city engineer, serving utility, and the off-street improvements contractor. Requirements of the utility company which exceed the provisions made on the Drawings or covered by these Specifications shall take precedence. Provisions made on the Drawings or Specifications in excess of the utility company's requirements shall take precedence. No additional compensation will be allowed the contractor for connection fees or additional work or equipment not covered in the Drawings or Specifications which are a result of policies of the serving utilities.

### 3.3 MECHANICAL EQUIPMENT WIRING

- A. Provide all mechanical equipment motors, automatic temperature, limit, float and similar control devices required, with wiring complete from power source indicated on Electrical Drawings.
- B. Provide properly rated motor overload and undervoltage protection and all manual or automatic motor operating devices for all mechanical equipment.
- C. Equipment and systems shown on the Drawings and/or specified, are based upon requirements of specific manufacturers which are intended as somewhat typical of several makes which may be approved. Provide all field wiring and/or devices necessary for a complete and operable system including controls for the actual selected equipment/system.

- D. Provide all starters for mechanical motors. Review Electrical Specifications and Drawings to determine which mechanical motor starters will be provided under the Electrical Specification Sections and provide all others.

### 3.4 GENERAL INSTALLATION

- A. **Locating and Positioning Equipment:** Observe all Codes, Regulations and good common practice in locating and installing mechanical equipment and material so that completed installation presents the least possible hazard. Maintain adequate clearances for repair and service to all equipment and comply with Code requirements.
- B. **Arrangement:** Arrange piping parallel with primary lines of the building construction, and with a minimum of 7' overhead clearance in all areas where possible. Unless indicated otherwise, conceal all piping. Locate operating and control equipment properly to provide easy access, and arrange entire mechanical work with adequate access for operation and maintenance. Give right-of-way to piping which must slope for drainage. Set all equipment level or as recommended by manufacturer. Under no conditions shall beams, girders, footings or columns be cut for mechanical items. Casting of pipes into concrete is prohibited unless so shown on Drawings.
- C. **Drip Pans:** Provide drip pans under all domestic hot water heaters and all above ceiling in-line pumps and cooling coils. Locate pan immediately below piping and equipment, and extend a minimum of 6" on each side and lengthwise 18" beyond equipment being protected. Fabricate pans 2" deep, of reinforced 20 gauge galvanized sheet metal with watertight seams and rolled or hemmed edges. Provide 3/4" drainage piping, properly discharged to over floor drain or as shown on the Drawings. Comply with Mechanical Code for overflow protection and pipe sizing.
- D. **Access Panels:** Provide access panels with proper backing reinforcement for all equipment, dielectric unions, valves and items requiring service and installed above ceilings, behind walls, or in furring, complete with correct frame for type of building construction involved. Exact size, number and location of access panels are not necessarily shown on Drawings. Use no panel smaller than 12" by 12" for simple manual access or smaller than 16" x 20" where personnel must pass through.
- E. **Adjusting:** Adjust and calibrate all automatic mechanical equipment, mixing valves, flush valves, float devices, etc. Adjust flow rates at each piece of equipment or fixture.
- F. **Building Vapor Barrier:** Wherever the building insulation vapor barrier is penetrated by piping, hangers, conduits, etc., provide clear self-adhesive tape recommended by the insulation manufacturer around the penetrations.

- G. Concrete Work: Coordinate with other work, particularly other concrete work and accessories. Comply with applicable provisions of Section 03310 for mechanical work concrete, including formwork, reinforcement, mix design, materials (use mix designs and materials accepted for Division 3 work where possible), admixtures, accessories, (including waterstops), placing of wet concrete, finishing, curing, protecting, testing, submittals and other requirements of the concrete work.
- H. Housekeeping Pads: Construct minimum 3" thick with chamfered edges using 3000 psi concrete. Provide #4 reinforcing bars 8" on center in each direction and within 4" of each edge, centered in pad thickness. Provide ½" dowel with 3" embedment into floor slab for each 2 square feet of pad area. Dowels and equipment anchor bolts shall be spaced a minimum of 6" from pad edges.

### 3.5 VALVE INSTALLATION

- A. General: Comply with the following requirements:
  - 1. Install valves where required for proper operation of piping and isolation of equipment, including valves in branch lines where necessary to isolate sections of piping, and where shown on the drawings. Install valves at low points in piping systems that must be drained for service or freeze protection.
  - 2. Locate valves in accessible spaces (or behind access panels) and so that separate support can be provided when necessary.
  - 3. Install valves with stems pointed up, in the vertical position where possible, but in no case with stems pointed downward from a horizontal plane.
- B. Insulated Valves: Install extended-stem valves in all piping specified as insulated, and arrange in the proper manner to receive insulation.
- C. Valve Access: Provide access panels to all valves installed behind walls, in furring or otherwise inaccessible.
- D. Lubricant-Seal: Select and install plug valves with lubricant-seal except where frequent usage is indicated or can be reasonably expected to occur.

### 3.6 INSTALLATION OF HANGERS AND SUPPORTS

- A. General: Proceed with the installation of hangers, supports and anchors only after the required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) the proper placement of inserts, anchors and other building structural attachments.
  - 1. Install hangers, supports, clamps, and attachments to support piping and equipment properly from the building structure. Use no wire or perforated metal to support piping, and no supports from other piping or equipment. For exposed continuous pipe runs, install hangers and supports of the same type and style as installed for adjacent similar piping.
  - 2. Prevent electrolysis in the support of copper tubing by the use of hangers and supports which are copper plated or by other recognized industry methods.
  - 3. Support piping independently of any fire sprinkler piping.

4. Arrange supports to prevent eccentric loading of joists and joist girders. Locate supports at panel points only. Do not drill beam or joist flanges for hanger attachment.

B. Provisions for Movement:

1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate the action of expansion joints, expansion loops, expansion bends and similar units. Install specified seismic restraints to restrict excessive movement.
2. Install hangers and supports so that equipment and piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
3. Install hangers and supports to provide the indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded. Comply with the following installation requirements:
  - a. Clamps: Attach clamps, including spacers (if any), to piping outside the insulated piping support. Do not exceed pipe stresses allowed by ANSI B31.
  - b. Insulated Pipe Supports: Insulated pipe supports shall be supplied and installed on all insulated pipe and tubing.
  - c. Load Rating: All insulated pipe supports shall be load rated by the manufacturer based upon testing and analysis in conformance with ASME B31.1, MSS SP-58, MSS SP-69 and MSS SP-89.
  - d. Support Type: Manufacturer's recommendations, hanger style and load shall determine support type.
  - e. Insulated Piping Supports: Where insulated piping with continuous vapor barrier or where exposed to view in finished areas is specified, install hard maple wood insulation shields (Elcen Fig. 216) or steel pipe covering protection shields (MSS type 39) at each hanger.

C. Pipe Support:

1. Vertical Spacing: Support at base, at equivalent of every floor height (maximum 10' as required by Code) and just below roof line.
2. Screwed or Welded Steel or Copper Piping: Maximum hanger spacing shall be as follows:

	<u>Steel</u>	<u>Copper</u>
1-1/4" and smaller	7' span	6' span
1-1/2" pipe	9' span	6' span
2" pipe	10' span	10' span
2-1/2" & larger	12' span	10' span

3. Cast Iron Soil Pipe:
  - a. Hubless and Compression Joint: At every other joint except when developed length exceeds 4', then at each joint.
  - b. Additional Support: Provide at each horizontal branch and/or at concentrated loads to maintain alignment and prevent sagging.
4. Glass Pipe: Maximum 3' hanger spacing or as recommended by manufacturer.

5. Polyvinyl Chloride, Polypropylene and Other Plastic Pipe: Maximum hanger spacing and minimum rod diameters as follows:
  - a. Continuous support 1/2" to 4" pipe size Fee & Mason No. 109 channels with Fee & Mason No. 108 hanger. Lay pipe directly into the channel with fittings or couplings placed in spaces between channel sections. Secure piping to the channel at intervals between hangers with a few turns of vinyl electrical tape.
  - b. Non-Continuous Support: Maximum 4' spans or shorter if required by manufacturer for temperatures and pipe schedule.
  - c. Arrange supports to allow free movement, but restrict upward movement of lateral runs so as not to create reverse grade on drainage pipe. Use double bolt clamp or band hanger with restraint (Tolco fig. 25).
6. Install additional hangers or supports at concentrated loads such as pumps, valves, etc. to maintain alignment and prevent sagging.
7. Support Rod: Hanger support rods sized as follows:

<u>Pipe and Tube Size</u>		<u>Rod Size</u>	
<u>Inches</u>	<u>mm</u>	<u>Inches</u>	<u>mm</u>
1/2" to 4"	12.7 to 101.6	3/8"	9.5
5" to 8"	127.0 to 203.2	1/2"	12.7
10" to 12"	254.0 to 304.8	5/8"	15.9

- D. Adjust hangers and supports to bring piping to proper levels and elevations.
- E. Provide all necessary structural attachments such as anchors, beam clamps, hanger flanges and brackets in accordance with MSS SP-69. Attachments to beams wherever possible. Supports suspended from other piping, equipment, metal decking, etc., are not acceptable.
- F. Horizontal banks of piping may be supported on common steel channel member spaced not more than the shortest allowable span required on the individual pipe. Maintain piping at its relative lateral position using clamps or clips. Allow lines subject to thermal expansion to roll axially or slide. Size channel struts for piping weights.
- G. Installation of drilled-in concrete anchors shall comply with the manufacturers instructions for working load, depth of embedment, and spacing between anchors and from the edge of the slab. Use only wedge style anchors.
- H. Seismic Restraints: Install restraints where recommended in SMACNA "Seismic Restraint Manual." Show analysis of supporting structure, anchorages, and restraints in accordance with OSSC Section 1613 and reference ASCE standard. Seismic restraint system components shall be approved by the California Office of Statewide Health Planning and Development (OSHPD). Acceptable Manufacturers: Amber/Booth, Mason Industries, Tolco, or approved.

### 3.7 FREEZE PROTECTION ELECTRIC HEAT CABLE INSTALLATION

- A. Selection: Select cable watts/foot of pipe based upon maintaining 50 deg. F pipe temperatures with specified insulation thickness, pipe sizes and outside weather conditions of zero degrees F and 20 mph wind.



- B. Installation: Install heat cable under the insulation with the recommended number of wraps per foot of pipe and with all necessary accessories and bulb-stat with 3' capillary. Also protect all fittings and valves. Secure cable to piping with cable ties or fiberglass tape.
- C. Electrical: Connect to nearest available power source indicated on the Electrical Drawings. Verify electrical characteristics required.

### 3.8 PLUMBING SYSTEM IDENTIFICATION

- A. Piping System: Indicate each pipe system by its generic name (abbreviated) as shown/scheduled/specified; except vent and drainage piping. Comply with ANSI A13.1 for marker locations, letter sizes, and colors. Include arrows to show direction of flow and "Electric Traced" signs to identify heat cable wrapped piping. Locate pipe labels in accessible areas as follows:
  - 1. Near each valve, meter, gauge, or control device.
  - 2. Near equipment such as pumps, heat exchangers, water heaters, etc.
  - 3. At piping branch connections.
  - 4. At penetrations (each side) of walls, ceilings, and floors.
  - 5. At access panels and doors.
  - 6. At 25 foot maximum intervals. Provide a minimum of 1 label above each room where lift out ceiling is installed. Reduce intervals in congested areas such as mechanical rooms.
- B. Valve Identification: Tag all valves with brass disc and chain. Prepare valve charts indicating valve number, size, location, function and normal position. Use no duplicate numbers in Plumbing and Heating systems. Mount glazed frames containing one set of valve charts in the building mechanical room.
- C. Equipment: Provide engraved plastic-laminate signs at locations of major equipment such as heat exchangers, pumps, etc. Identify equipment in field same as on drawings. Permanently mount in an appropriate and effective location.
- D. Operation Tags: Where needed for proper and adequate information on operation and maintenance of mechanical systems, provide tags of plasticized card stock, either pre-printed or hand printed to convey the message; example: "DO NOT CLOSE THIS VALVE EXCEPT WHEN THE PUMP IS OFF."

### 3.9 EQUIPMENT CONNECTIONS

- A. Provide complete plumbing connections for all items of equipment requiring such connections, including incidental piping, fittings, trim and labor necessary for a finished working installation.
- B. Verify the rough-in and finish requirements for all equipment provided under other Divisions of the work and requiring plumbing connections with equipment supplier and installer prior to rough-in. Minimum branch pipe size for fixtures shall be 1/2".

### 3.10 PROTECTION

- A. Protect all work and materials against loss or damage. Close all pipe openings with caps or plugs. At final completion, thoroughly clean and deliver all work and equipment in an unblemished new condition. Keep all motors and bearings in watertight and dustproof covers during entire course of installation.
- B. Protect floors, walls, framing and sheathing where pipe cutting and threading operations are conducted with plastic sheeting under plywood sheets. Extend plastic sheeting beyond the plywood. Clean-up metal cuttings, oil, etc., daily or as necessary to prevent debris from being tracked beyond the protected area. Damages, as determined by the Architect, due to the pipe cutting/threading operation shall be repaired by the responsible trade.

### 3.11 CUTTING AND PATCHING

- A. General: Comply with the requirements of Division 1 for the cutting and patching of other work to accommodate the installation of mechanical work. Do all necessary cutting and patching of existing building and yard surfaces required for completion of the mechanical work. Patch to match finish and color of adjacent surfaces.
- B. Precautions:
  - 1. In the event insulated piping or equipment and/or sprayed or trowelled-on fireproofing, sprayed acoustical material, and similar materials are uncovered during the cutting, patching or demolition operation, notify the Architect immediately to investigate the possibility that it is asbestos-laden material. Do not damage or attempt to remove any material suspected of containing asbestos.
  - 2. Do not proceed with the Work in such areas until so instructed by the Architect.

### 3.12 PIPE PENETRATION FIRE STOPPING

- A. Install as recommended by manufacturer and in accordance with the product's UL listing. Below are the minimum installation requirements.
  - 1. Install specified penetrating item(s) with required annular spacing in proper size wall or floor opening. Support penetrating item(s) adequately on both sides of construction.
  - 2. Clean all opening and penetrating item surfaces in penetration area to remove loose debris, dirt, oil, wax, grease, old caulking, etc.
  - 3. If needed or required for gypsum or concrete block walls, install specified galvanized steel wire mesh or sleeve recessed and centered inside wall around penetrating item(s) so that it is snug against perimeter of opening.
  - 4. When required, install specified type and depth of backing material in annular space, recessed to required fill depth of fire stopping caulking.
  - 5. Gun, trowel, and/or pump fire stopping sealant to specified depth in annular space around penetrating item(s). Trowel sealant surfaces flush with wall or floor surfaces to a smooth, defect-free finish. Where required, apply specified size caulking bead around penetrating item(s) at zero annular contact areas and tool smooth.

### 3.13 MATERIALS AND EQUIPMENT FURNISHED BY THE OWNER FOR INSTALLATION BY THE CONTRACTOR

- A. Description: Refer to the Drawings for list of fixtures and equipment furnished by the Owner to be installed by the Contractor.
- B. Schedule: Inform the Owner in writing a minimum of 48 hours in advance of when fixtures, trim and/or equipment are needed for installation.
- C. Receiving: Inspect all received material and verify the condition and suitability of it for this project. Report any defects or discrepancies immediately to the Owner for resolution.

### 3.14 MECHANICAL PAINTING

- A. Minimum Requirements: Comply with minimum requirements of Division 9, Painting. All mechanical equipment, piping, insulation, etc., exposed in finished areas, storage rooms and other locations except mechanical equipment rooms will be painted under Section 09900.
- B. Painting Materials: Materials shall comply with Section 099000, Painting and shall be compatible with the material to be painted.
- C. Uninsulated Piping: Paint black or galvanized uninsulated piping located buried in ground, in concrete or masonry one (1) coat acid-resisting black paint. Paint black or galvanized uninsulated piping in moist equipment rooms, crawl spaces without vapor barriers, or exposed to weather one (1) coat black asphaltum varnish.
- D. Iron Work: Paint hangers, rods, anchors, guides, threads of galvanized pipe, bases, supports, uncoated sheet metal and other iron work without factory finish, exposed to weather, located in moist concealed spaces and moist equipment rooms, one coat acid-resisting black paint. Apply one (1) coat Dixon's Aluminum Graphite No. 209 paint over the (1) coat primer as recommended by paint manufacturer to all hot metal surfaces.
- E. Piping in Mechanical Room: All insulated and uninsulated piping exposed in mechanical equipment rooms shall be painted. Painting is not required for cast iron, plastic, or glass waste piping, or for stainless steel piping, PEX tubing and soft copper tubing. Contractor shall submit proposed colors for approval. In lieu of painting, insulated piping may be covered with colored PVC insulation jacketing as specified in Section 22 07 00, Plumbing Insulation.
- F. Insulated Piping and Other Insulated Surfaces: Paint insulated piping in half-round, split tile, or other inaccessible locations, one (1) coat asphalt emulsion.

### 3.15 PLUMBING WORK CLOSEOUT

- A. General: Refer to the Division 1 sections for general closeout requirements. Calibrate all equipment requiring same. Complete each system as shown or specified herein and place in operation except where only roughing-in or partial systems are called for. Each system shall be tested and left in proper operation free of leaks, obstructions, or contamination.
- B. Record Drawings: Submit record set of drawings required in Section 01300, Submittals, or as previously specified in this Section.

- C. Closeout Equipment/Systems Operations: Sequence operations properly so that work of project will not be damaged or endangered. Coordinate with seasonal requirements. Operate each item of equipment and each system in a test run of appropriate duration with the Architect present and with the Owner's operating personnel present, to demonstrate sustained, satisfactory performance. Adjust and correct operations as required for proper performance. Clean and lubricate each system, and replace dirty filters, excessively worn parts and similar expendable items of the work.
  
- D. Operating Instructions: Conduct a walk-through instruction seminar for the Owner's personnel who are to be involved in the continued operation and maintenance of plumbing equipment and systems. Provide written instructions outlining and explaining the identification system, operational diagrams, emergency and alarm provisions, sequencing requirements, seasonal provisions, security, safety, efficiency and similar features of the systems.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. The requirements of this section apply to the insulation of plumbing systems specified elsewhere in these specifications.
- B. The requirements of Section 22 05 00, Common Plumbing Materials and Methods, also apply to this section.

### 1.2 QUALITY ASSURANCE

- A. Minimum Insulation Thickness and Thermal Performance: Comply with the State of Oregon Energy Efficiency Code except where more stringent requirements.
- B. Composite (Insulation, Jacket or Facing and Adhesives) Fire and Smoke Hazard Ratings: Not to exceed a flame spread of 25 or smoke development of 50 and containing less than 0.1% by weight deca-PDE fire retardant.
- C. Component Ratings of Accessories (Adhesives, Mastics, Cements, Tapes, Finishing Cloth for Fittings): Same as "B" requirements above and permanently treated. No water soluble treatments.

### 1.3 SUBMITTALS

- A. Submit catalog data and performance characteristics for each product specified.

### 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: In addition to the requirements specified in Section 22 05 00, the following apply:
  - 1. Deliver insulation, coverings, cements, adhesives and coatings to the site in factory-fabricated containers with the manufacturer's stamp or label affixed showing fire hazard ratings of the products. Store insulation in original wrappings and protect from weather and construction traffic.
  - 2. Protect insulation against dirt, water, chemical and mechanical damage. Do not install damaged insulation. Remove such insulation from project site.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Insulation Manufacturers: Johns Manville, Owens-Corning, Knauf, Certain Teed, Armstrong, Pabco, Imcoa or Nomaco. Johns Manville products are listed unless indicated otherwise.
- B. Adhesive Manufacturers: Foster, 3M, Insul-Coustic, Borden, Kingco or Armstrong.

## 2.2 PIPING INSULATION

- A. Interior and Exterior Piping Systems 32 to 180 Deg. F: Glass fiber preformed pipe insulation with a minimum K-value of 0.23 at 75 deg. F, a minimum density of 3.5 pounds per cubic foot within all-service vapor barrier jacket, vinyl or pre-sized finish and pressure sensitive seal containing less than 0.1% by weight deca-PDE fire retardant.
- B. Exterior Installations: Same as for interior installations except 0.016" aluminum finish jacket or, in coastal environments, 0.016" stainless steel.
- C. Pipe Temperatures Minus 30 to 180 Deg. F: Flexible, preformed, pre-slit, self-sealing elastomeric pipe insulation up to 2-1/8" ID, thermal conductivity of 0.27 BTU/hr. sq. ft./in. at 75 deg. F and vapor transmission rating of 0.2 perms/inch. On cold surfaces, apply in thickness necessary to prevent condensation on the surface at 85 deg. F and 70% RH. Armstrong "Armaflex 2000" or, in concealed locations, Imcoa or Nomaco also approved.

## 2.3 EQUIPMENT INSULATION

- A. Equipment Temperatures Below 70 Deg. F: Flexible, closed cell, elastomeric sheet insulation of 5.5 #/cubic feet density and 0.27 thermal conductivity at 75 deg. F. Armstrong "Armaflex."
- B. Equipment Temperatures From 70 to 450 Deg. F: Glass fiber 3 pound density insulation with a 0.23 thermal conductivity at 75 deg. F. Johns Manville "814 Spin-Glas" with "FSK" jacket containing less than 0.1% by weight deca-PDE fire retardant or finished as recommended by manufacturer.
- C. Equipment Temperatures From 350 to 1200 Deg. F: Molded high temperature calcium silicate minimum 12.5 pound density and 0.4 thermal conductivity at 200 deg. F mean temperature. Glass cloth finish, Claremont Diplag or finished as recommended by insulation manufacturer.
- D. Exterior Tanks and Equipment Insulation Covering: Same as interior insulation with weatherproof metal or finished as recommended by insulation manufacturer.

## 2.4 INSULATION ACCESSORIES

- A. Insulation Compounds and Materials: Provide rivets, staples, bands, tapes, adhesives, cements, coatings, sealers, welded studs, etc., as recommended by the manufacturer for the insulation and conditions specified. No staples allowed on cold water piping systems.
- B. Interior Tanks and Equipment Insulation Covering: Finished metal jacket or as recommended by the manufacturer for insulation material specified.
- C. PVC Protective Jacketing and Valve and Pipe Fitting Covers: Johns Manville Zeston 2000, Proto LoSmoke, or Ceel-Co Ceel-Tite 100 Series with precut fitting fiberglass insulation or approved.

- D. Jacket Lap Sealing Adhesives: Foster Drion 85-75 contact cement or approved substitute.
- E. Saddles and Shields: Install to prevent crushing of insulation at support points.
  - 1. Protection Saddles: MSS Type 39.
  - 2. Protection Shields: MSS Type 40.
  - 3. Preinsulated Pipe Supports: Calcium silicate load bearing metal jacketed inserts. Pipe Shields Inc. or accepted substitute.
    - a. Pipe supported on rods - Models A1000, A2000, A3000, A4000.
    - b. Pipe supported on flat surfaces - Models A1000, A2000, A3000, A4000.
    - c. Pipe supported on pipe rolls - Models A3000, A4000, A5000,.
    - d. Vertical riser clamp – Models E1000, E1100, E1200.
- F. Removable/Reusable Insulation Covers:
  - 1. Insulation Filler: Install 2-1/4# - 4#/cu. ft. glass fiber, 6# - 8# / cu. ft. mineral wool or glass fiber/type E felted (9#/cu. ft.) flexible blankets and pads for large, irregular shaped equipment such as pump casings, bolting flanges, etc. For small common shapes such as valves, elbows, flanges, etc., install preformed flexible glass fiber pipe wrap, preformed glass fiber pipe covering or glass fiber/type E felted (9#/cu. ft.) insulation.
  - 2. Hot Encasement: Glass fiber cloth plain or silicon coated on both sides, knitted stainless steel mesh, glass fiber cloth laminate with aluminum, or stainless steel foil or hex wire mesh.
  - 3. Cold Encasement: Glass fiber cloth silicon coated both sides, knitted stainless steel mesh, glass fiber cloth laminate with aluminum or stainless steel foil or glass fiber cloth with nickel wire insertion, silicon coated both sides.
  - 4. Stitching: Glass fiber thread/PVC coated, staples - galvanized or stainless steel, galvanized or stainless steel hog rings, 0.010" - 0.15" dia/dead soft stainless steel wire.
  - 5. Attachments and Securements:
    - a. Quilting: Stainless 2-hole washers, both sides with twisted 0.035" - 0.051" wire loops, 12 ga. stainless spindle/washer/ speed clip assembly or stainless 0.035" - 0.051" wire loops.
    - b. Lacing and Hooks: Stainless 2-hole 12 gage bent wire lacing hooks, stainless 2-hole dished washer assembly with twisted 0.035" - 0.051" wire loops, 12 gage stainless spindle washer with built-in hook and speed clip or stainless 1-hole dished and flat washer riveted through the cloth.

## PART 3 - EXECUTION

### 3.1 PIPING INSULATION

- A. General: Do not insulate underground piping except at joints and fittings on preinsulated piping unless indicated otherwise.

- B. At the contractor's option and in accordance with Part 2 of this section, elastomeric insulation may be installed on domestic water piping in thicknesses providing overall thermal resistance equivalent to the glass fiber insulation. Increased thickness is typically required. Installation shall comply with the manufacturer's recommendation with joints and seams completely sealed.
- C. Domestic Water Piping:
  - 1. Insulate with glass fiber pipe covering, 1" thick for cold water piping and for 1" and smaller hot water piping; 1-1/2" for 1-1/4" and larger hot water piping.
  - 2. Insulate hot water return piping same as cold water piping.
  - 3. Insulate all water piping exposed to outside weather and freezing temperatures with 1" thickness of glass fiber pipe covering with weather-proof metal jacket. Apply insulation after heat cable is installed.
- D. Interior Rain Drains:
  - 1. Concealed: Insulate with 1" thick one pound density glass fiber blanket and continuous vapor barrier jacket.
  - 2. Exposed: Insulate with 3.5 pound density glass fiber insulation with continuous vapor barrier jacket.
  - 3. Cold climates: Insulate over heat tape where indicated.
- E. Waste Lines: Insulate all pipe exposed to outside temperatures with 3/4" thick glass fiber pipe insulation with a vapor barrier jacket.
- F. Pipe Fittings:
  - 1. Insulate and finish all fittings including valve bodies, bonnets, unions, flanges and expansion joints with precut fiberglass insulation and preformed PVC covers sealed to adjacent insulation jacket for continuous vapor barrier covering over all fittings.
  - 2. Provide removable/reusable insulation covers on 4" and larger valves, unions, flanges, pump casings, strainers and similar fittings or equipment requiring periodic service.
- G. Protective Covering: Install continuous protective PVC or metal covering on all piping and fittings in mechanical rooms, accessible tunnels, attic spaces, accessible ceilings, etc., where insulation may be subject to damage. Install with rivets or cement seams and joints.
- H. Piping Insulation Lap Seams and Butt Joints: Install insulation jacket in accordance with manufacturer's recommendation and without staples on cold water lines. Where jacket joint and lap seams have not adhered, remove affected section of insulation and reinstall or apply lap sealing adhesive in accordance with manufacturer's instructions.

### 3.2 NON-JACKETED HOT WATER TANKS

- A. Materials: Insulation blanket and metal jacket as specified above.



- B. Manholes, Nameplates, Handholes, Cleanouts, Etc.: Do not insulate over manholes, ASME Code stamps, manufacturer's nameplates, handholes, cleanouts, etc. Provide neatly beveled edges at interruptions of the insulation. When surfaces are to operate below ambient saturation temperatures, provide removable sections of insulation to cover the above with vapor sealed edges. Provide appropriate tagging.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide pipe, pipe fittings, piping specialties, pumps and related items required for complete piping system.
- B. Related Work: The requirements of Section 22 05 00, Common Plumbing Materials and Methods, also apply to this section.

### 1.2 QUALITY ASSURANCE

- A. General: ASTM, and ANSI Standards are indicated. In addition, special standards are referenced where neither ASTM nor ANSI Standards are applicable.
- B. Labeling: All piping shall be continuously and legibly labeled on each length as required by codes and standards and including as a minimum, country of origin, manufacturer's identification marking, wall thickness designation, and applicable standards and approvals. Fittings shall be labeled as required by the referenced standard. Tubular fixture traps shall be stamped with manufacturer's mark and material thickness.
- C. Potable Water Valves: Potable water piping materials not limited to faucets, mixing valves, or pressure reducing valves. Valves shall meet NSF Standard 61, Section 9, for drinking water faucets and shall be brass construction. Brass components which contact water within the faucet shall be from brass which contains no more than 3 percent lead by dry weight.
- D. Concealed Plastic Piping: No concealed plastic piping inside the building unless approved by Code or Governing Authorities.
- E. Definitions: Where piping fluid is not indicated in the following paragraphs, provide similar piping materials for similar fluids (i.e., "make-up water" = "domestic water"; "wet stand pipe" = "fire sprinkler pipe"; "drainage piping" = "sanitary/storm sewer piping").
- F. Plumbing System Disinfection shall be performed by an experienced, qualified, chemical treatment agency. Mt. Hood Chemical, Chemcoa, or approved alternate.

### 1.3 STORAGE AND HANDLING

- A. Provide factory-applied end caps on each length of pipe and tube. Maintain end caps through shipping, storage and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

### 1.4 SUBMITTALS

- A. Submit catalog data for each product specified.

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PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Copper Pipe and Tube:

1. Application:
  - a. Domestic water
  - b. Priming lines
2. Pipe: ASTM B88.
  - a. Above Ground Domestic Water: Type L hard temper copper with soldered joints.
  - b. Underground Domestic Water and Priming Lines: Type L soft annealed with no joints or type K hard tempered copper with silver soldered joints.
3. Fittings: Wrought copper solder-joint fittings, ANSI B16.22.
4. Preinsulated Piping: Type K solder joint copper piping with 1" thick urethane insulation protected by 20 gauge PVC outer jacket. Rovanco "Insul/80," equivalent Rikwil or approved substitute.

B. Galvanized Steel Pipe:

1. Applications: Aboveground only and 2" and smaller.
  - a. Sanitary waste
  - b. Rain drain
  - c. Plumbing vent
  - d. Cooling condensate drain
2. Pipe: Schedule 40, standard galvanized steel pipe, ASTM A-53 or A-106.
3. Fittings: Cast iron threaded drainage pattern fittings, ANSI B16.12.

C. Plastic Pipe – Drain, Waste, Vent (DWV):

1. Application: Three-story or less structures and where allowed by Code only.
  - a. Sanitary waste
  - b. Plumbing vent
  - c. Rain drain
2. Pipe:
  - a. Acrylonitrile-butadiene-styrene (ABS) (ASTM D3965) plastic drain, waste and vent piping (ASTM F628) and fittings (ASTM D2661) (DWV).
  - b. Poly(vinyl chloride) (ASTM D1784) (PVC) plastic drain, waste and vent pipe (ASTM D2665 and D1785) and fittings (ASTM D2665) (DWV).
3. Fittings: Provide fittings of the type indicated, matching piping manufacture. Where not otherwise indicated, provide socket style, solvent weld fittings produced and recommended for the service indicated by the piping manufacturer.

D. Cast Iron Pressure Pipe:

1. Application: 4" and larger.
  - a. Water
  - b. Pressure sewer

2. Pipe: Ductile iron coated outside with bitumastic enamel, ANSI A21.51.
  3. Fittings: Gray or ductile iron bolted stuffing box mechanical joint or rubber ring joints, ANSI A21.1. Rubber gaskets, lubricants, bolts, and nuts, ANSI A21.11.
- E. Plastic Pipe:
1. Application: Where approved by Code.
    - a. Domestic water
    - b. Distilled and deionized water
  2. Pipe:
    - a. Cross-linked polyethylene (PEX) tubing for Water Service: ASTM F877; SDR 9. NSF-pw and NSF 61.
  3. Fittings: Provide fittings of the type indicated, matching piping manufacturer. Where not otherwise indicated, provide fittings produced and recommended by the piping manufacturer for the service indicated.
- F. Flexible Gas Piping (CSST):
1. Application: 5 psi or less:
    - a. Natural gas
    - b. LPG (Propane gas)
  2. Pipe: Corrugated 300 series stainless steel tubing with yellow polyethylene jacketing.
  3. Fittings: Fittings shall be yellow brass and provide a self-flaring connection to the tubing. Systems incorporating gaskets or o-rings are not acceptable.
  4. Underground installations: CSST pre-sleeved with heavy wall internally ribbed polyethylene secondary venting conduit with end seals and vent connection fittings.
  5. Approvals: System shall be listed by an approved independent laboratory and approved for use by the local code officials. TracPipe, Gastite, or approved.

## 2.2 MISCELLANEOUS PIPING MATERIALS

- A. Insulating (Dielectric) Fittings: Provide standard products recommended by the manufacturer for use in the service indicated, and which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and reduce corrosion. Victaulic "Clear Flow."
- B. Soldering and Brazing Materials: Provide soldering materials as determined by the installer to comply with installation requirements.
1. Tin-Antimony Solder: ASTM B32, Grade 95TA.
  2. Lead-Free Solder: ASTM B32, Grade HB. Harris "Bridgit" approved.
  3. Silver Solder: ASTM B32, Grade 96.5TS.
  4. Flux: Water soluble paste flux.
  5. Brazing filler rod: BCuP rod to suit conditions.
- C. Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast-iron flanges; raised-face for steel flanges. Pressure and temperature rating required for the service indicated.

- D. Pipe Sleeves: For installation in cast in place concrete floor systems. UL 1479 listed with ratings for fire, smoke, and water intrusion. Cast in place pipe sleeve with external waterstop collar and interior pipe seal and intumescent collar. Holdrite "Hydroflame".
- E. Sleeve Seal: Rubber-link pipe wall and casing closure. Thunderline Link-Seal. For fire rated wall, floor or ceiling penetrations, 3-M "CP-25" caulk, "No. 303" putty and/or "PSS 7904" sealing system.
- F. Strainers: "Y-pattern," Class 125 [epoxy coated iron body] [bronze body] with tapped blow-off connection and removable 20 mesh stainless steel screen. NIBCO or equal.
- G. Tracer Wire: 14 gauge, single strand, copper wire with blue insulation for water, green for sanitary and storm sewers, and yellow for gas. 3M "DBY" direct bury splice kit required at all splices.

### 2.3 PIPING SPECIALTIES

- A. Cleanouts:
  - 1. Manufacturer: J.R. Smith, Zurn, Wade, Watts, Josam, Mifab, Sioux Chief, or approved substitute.
  - 2. Types:
    - a. Tile Floor Cleanouts: Smith 4053-U with square heavy-duty nickel bronze top, bronze plug, and vandalproof screws. Adjustable top where cast into floor slab.
    - b. Carpeted Floor Cleanout: Smith 4023-U-X with round heavy-duty nickel bronze top, bronze plug, carpet clamping device, and vandalproof screws. Adjustable top where cast into floor slab.
    - c. Concrete Floor Cleanout: Smith 4023 with round heavy-duty nickel bronze top. Adjustable top where cast into floor slab.
    - d. Wall Cleanouts: Smith 4472-U, bronze ferrule with raised head bronze plug, stainless steel shallow cover and vandalproof screws.
    - e. Outside Area Walks and Drives: Smith 4253-U-G with galvanized cast iron body, top secured with vandalproof screws, and bronze plug. Install in 18" x 18" x 6" deep concrete pad flush with grade.
    - f. Plastic Body Cleanouts: At contractor's option, where ABS-DWV or PVC-DWV piping is approved, compatible plastic body cleanouts may be substituted. Cleanouts shall have finished tops of style and material as specified above.
- B. Drains:
  - 1. Manufacturers: Zurn, Jay R. Smith, Josam, Watts, Wade, Froet Industries, Mifab, Sioux Chief, or approved substitute. Where numbers are scheduled on the drawings they represent minimum the acceptable standard for locations involved.
  - 2. Cast iron construction with acid resistant coating, anchor flange, and other options as indicated by model number. PVC drains where specifically noted. Cast iron dome strainers on roof drains.
  - 3. Install 4 pound sheet lead flashing, extending not less than 10" from and clamped to all drains not completely cast-in-place in a homogeneous material.

- C. Flashing: Minimum 4# sheet lead; to extend horizontally 10" from edge of vent penetrations or rain drain body and vertically 12" minimum up from roof turned over and down into hub of vent or finished with bronze cap providing counter-flashing for screwed pipe.
- D. Downspout Boot: Smith No. 1787-12, 4" diameter by 18", offset type. Smith No. 1785 or 1786 for rectangular downspouts.
- E. Traps: Except chrome plated fixture traps. Recessed drainage pattern for threaded pipe and same grade as pipe for cast iron and plastic pipe; with cleanout plugs in trap body in all above grade locations.
- F. Pressure Reducing Valve: Single seat type with renewable stainless steel seat and valve. Size and capacity as shown on Drawings. Bronze bodies with screwed connections on valves 2-1/2" and smaller and flanged steel bodies on valves 3" and larger. Install each PRV with strainer on inlet or internal strainer. Leslie, Watts, Apollo, Cash-Acme, Zurn-Wilkins, or approved substitute.
- G. Backflow Preventer: Where indicated on the Drawings, install a double check backflow preventer complete with strainer on inlet, shutoff valves, two separate check valves, and test cocks. USC Foundation for Cross Connection Control, State Health Officials, and serving utility approved. Bronze bodies on units 2" and smaller, and cast iron bodies with bronze trim on units 2-1/2" and larger.
- H. Master Mixing Valve: All brass or bronze body with stainless steel parts, thermostatic master control element to fail safe upon cold water or control element failure. Provide with external union angle check stops, strainers, volume control, shutoff valves, dial thermometer. Valve location, arrangement and capacity as shown on plans. Leonard, Lawler, Powers, Symmons, or approved substitute.
- I. Building Shut Off Valve Box: 10" round concrete enclosure with cast iron traffic weight cover. Brooks 3RT or approved substitute.

#### 2.4 BACKFILL MATERIALS

- A. Subbase Materials: A graded mixture of gravel, sand, crushed stone or crushed slag.
- B. Finely-Graded Subbase Material: Well graded sand, gravel, crushed stone or crushed slag, with 100% passing a 3/8" sieve.
- C. Backfill Material: Soil material suitable for compacting to the required densities, and complying with AASHTO designation M145, Group A-1, A-2-4, A-2-5. or A-3.
- D. Drain Field Fill Material: Washed and uniformly graded gravel crushed stone or crushed slag, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.
- E. Stabilization Fabric: Nonwoven stabilization and drainage fabric. Mirafi 140S or 140M.

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PART 3 - EXECUTION

3.1 UTILITY SERVICE

- A. Plumbing Utility Connections: Complete installation. Contact local serving utilities to determine conditions involved and make or arrange to have connection made at proper time and pay all costs involved.
- B. Sanitary and Storm Sewers: Connect to or arrange for connection to existing/ public sanitary and storm sewers as shown on the Drawings and as required by the serving utility. Verify depth, size and location prior to installation of the new sewer systems.
- C. Water Service: Connect to or arrange for connection to existing/public water service. Verify serving utility requirements prior to beginning any installation. Verify water main size, depth, pressure and location prior to starting work.
- D. Fire Service: Connect to or arrange for connection to existing public water main. Contact local serving utilities to determine conditions involved and make or arrange to have connection made at proper time and pay all costs involved. Provide vault and install backflow preventer provided under the fire sprinkler work specified in Section 21 13 00. Coordinate vault size and piping arrangement. Installation of meters and vault by the serving utility.

3.2 PIPE INSTALLATION

- A. General: Install pipe, tube and fittings in accordance with recognized industry practices, manufacturer's instructions, and plumbing code standards. Install each run accurately aligned with a minimum of joints and couplings, but with adequate and accessible unions and flanges for disassembly, maintenance and/or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Comply with ANSI B31 Code for Pressure Piping.
- B. Piping Runs: Route piping close to and parallel with walls, overhead construction, columns and other structural and permanent-enclosure elements of the building. Install piping plumb and level except where pitched for drainage. If not otherwise indicated, run piping in the shortest route which does not obstruct usable space or block access for servicing the building or equipment and avoid diagonal runs. Wherever possible in finished and occupied spaces, conceal piping from view. Do not encase horizontal runs in solid (concrete or CMU) partitions.
- C. Piping: Install for services as specified in Part 2. The following are special requirements:
  - 1. Underground Drainage Pipe: Install cast iron soil pipe for the following conditions. When specified in Part 2 of this Section and where allowed by Code, plastic piping may be installed in lieu of cast iron piping.
    - a. Under the building to 5' outside the building structure.
    - b. 5' each way from a potable water line crossing.
    - c. First section (minimum 5') from any connection to underground structures such as catch basins, manholes, disposal well or tank, etc.
    - d. Through all fill areas where pipe cannot be rested on undisturbed earth.

- e. Where the top of the pipe is less than 12 inches below finish grade.
  - f. At contractor's option in lieu of concrete or clay sewer pipe.
2. Existing Domestic Water Piping: Piping materials as specified in Part 2 except where existing domestic water piping to be connected to is galvanized steel, new galvanized steel piping for short branches and rough-ins may be installed.

### 3.3 PIPING JOINTS

- A. General: Provide joints of the type indicated in each piping system, and where piping and joint as manufactured form a system, utilize only that manufacturer's material.
- B. Ferrous Threaded Piping: Thread pipe in accordance with ASME B1.20.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave no more than three threads exposed.
- C. Solder Copper Tube and Fitting Joints: In accordance ANSI B 828 with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in a manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens. "T-Drill" field formed tees may be utilized where the main is at least two pipe sizes larger than the branch.
- D. Braze Copper Tube and Fitting Joints: Where indicated. Pass a slow stream of dry nitrogen gas through the tubing at all times while brazing to eliminate formation of copper oxide.
- E. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gasket.
- F. Concrete Sewer Pipe Joints: Comply with applicable provisions of "Concrete Pipe Field Manual" by the American Concrete Pipe Assoc.
- G. Plastic Pipe/Tube Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards:
  - 1. Heat Joining of Thermoplastic Pipe: ASTM D-2657.
  - 2. Making Solvent-Cemented Joints: ASTM D-2865 and ASTM F-402.
- H. Glass Pipe Joints: Comply with manufacturer's instructions and recommendations.
- I. Grooved Pipe Joints: Comply with fitting manufacturer's instructions for making grooves in pipe ends. Remove burrs and ream pipe ends. Assemble joints in accordance with manufacturer's instructions. Visually inspect the assembled joint to ensure proper gasket seating.



- J. Insulating (Dielectric) Fittings: Comply with manufacturer's instructions for installing unions or fittings. Install in a manner which will prevent galvanic action and stop corrosion where the "joining of ferrous and non-ferrous piping" is indicated.
- K. Changes in Direction: Use fittings for all changes in direction. Run lines parallel with building surfaces.
- L. Line Grades:
  - 1. Drainage Lines: Run at maximum possible grade and in no case less than 1/4" per foot within building.
  - 2. Vents: Pitch for drainage 1/4" per 10'.
  - 3. Water: Pitch to low points and install hose bib drains. 3' minimum depth of ground cover for all lines outside building unless otherwise noted.
- M. Unions and Flanges: At all equipment to permit dismantling and elsewhere as consistent with good installation practice.
- N. Expansion: Provide loops, swing joints, anchors, runouts and spring pieces to prevent damage to piping or equipment.

### 3.4 CLEANOUTS

- A. Where required by code, at each change of sewer direction 45 degrees or greater and more than 10' long, at end of each branch or main and spaced not greater than 100' apart, as required by code and/or as shown on Drawings.

### 3.5 DRYWELL, CATCH BASIN, LEACHING WELL OR CESSPOOLS

- A. Set bottom ring on undisturbed earth and backfill around sides with not less than 24" of clean coarse gravel or crushed rock (1-1/2" to 2" size).

### 3.6 MISCELLANEOUS PIPING EQUIPMENT

- A. Floor, Wall and Ceiling Plates: Chrome plated pressed steel or brass screw locked split plates on all pipe penetrations in finished spaces.
- B. Strainers: Install in a manner to permit access for cleaning and screen removal and with blow-off valve.
- C. Sleeves: At all penetrations of masonry or cast in place concrete construction. PVC, 24 gauge galvanized steel tube or Schedule 40 galvanized steel pipe. Use steel pipe sleeves through beams, footings, girders or columns and for all penetrations of walls or floors below grade. Where floor finish is ceramic tile, terrazzo, or similar material extend standard steel pipe sleeves 1-1/2" above finished floor. Fabricate sleeves 1" diameter larger than pipe or insulation. PVC and sheet metal sleeves at non-structural penetrations only. Use specified sleeve system for all above grade concrete floor applications.

- D. Sleeve Caulking: Caulk below grade pipe with rubber link seal. Grout above grade pipe with cement mortar or approved waterproof mastic. All caulking or grouting shall extend full depth of sleeve. Utilize rubber sealing links in lieu of caulking. Install UL sealing caulk, putty and/or system at all penetrations of fire rated walls, floors and ceiling.
- E. Shock Arrestors: Install at end of mains, in a battery of three or more flush valve-operated fixtures water header, ahead of quick closing and solenoid operated valves. Size per PDI recommendations where size is not indicated. Provide access panels.
- F. Trap Priming: Traps serving floor drains, floor sinks, catch basins, and similar fixtures shall be primed in accordance with Code requirements.
- G. Domestic Hot Water Mixing Valves: Install in accordance with manufacturers installation instructions and piping diagrams.

### 3.7 EXCAVATING

- A. General: Do not excavate for mechanical work until the work is ready to proceed without delay, to minimize the total time lapse from excavation to completion of backfilling. Comply with all applicable Federal and state safety regulations and local erosion control requirements.
- B. Width: Excavate for piping with 6" to 9" clearance on both sides of pipe, except where otherwise shown or required for proper installation of pipe joints, fittings, valves and other work. Excavate for other work to provide minimum practical but adequate working clearances.
- C. Depth for Direct Support: For work to be supported directly on undisturbed soil, do not excavate beyond indicated depths, and hand-excavate the bottom cut to accurate elevations. Support the following work on undisturbed soil at the bottom of the excavations:
  - 1. Piping of 5" and less pipe/tube size.
  - 2. Cast-in-place concrete.
- D. Depth for Subbase Support: For large piping (6" pipe size and larger), tanks and where indicated for other mechanical work, excavate for installation of subbase material in the depth indicated, or, if not otherwise indicated, 6" below bottom of work to be supported.
- E. Depth for Exterior Piping: Excavate for exterior water-bearing piping (water and drainage) so that the top of piping will not be less than 3' vertical distance below finished grade.
- F. Depth for Unsatisfactory Soil Conditions: Where unsatisfactory soil condition at the bottom of excavation exists, excavate additional depth as directed to reach satisfactory soil-bearing condition. Backfill with subbase material, compacted as directed, to indicated excavation depth.
- G. Rock and Boulder Removal: Refer to Division 1 for procedure on additional work, including additional excavating and backfilling, rock removal, etc.

- H. Protection of Trees: Excavate near large trees (within the drip line) by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with asphaltic tree paint.
- I. Excavated Materials: Store excavated material (temporarily) near the excavation, in a manner which will not interfere with or damage the excavation or other work. Do not store under trees (within the drip line). Retain excavated material which complies with the requirements for backfill material. Dispose of excavated material which is either in excess of quantity needed for backfilling or does not comply with requirements for backfill material.
- J. Move unused material to another location on Owner's property, or adjacent to the project site, and dispose of as directed by the Architect. Remove unused material from project site, and dispose of in a lawful manner.

### 3.8 DEWATERING

- A. Maintain dry excavation for mechanical work by removing water. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations; protect excavations from major inflow of ground water by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations and below-grade property from being damaged by water, sediment or erosion from or through mechanical work excavations. Comply with local erosion control regulations where applicable.

### 3.9 BASE PREPARATION

- A. Subbase Installation: Where indicated, install subbase material to receive mechanical work, and compact by tamping to form a firm base for the work. For 4" and larger piping, horizontal cylindrical tanks and similar work, shape the subbase to fit the bottom 90 degrees of the cylinder, for uniform continuous support. Provide finely-graded subbase material for wrapped, coated and plastic pipe and tank. Shape subbases and bottoms of excavation with recesses to receive pipe bells, flanged connections, valves and similar enlargements in the piping systems and set bottom of trench at proper pitch and correct elevations with subbase material.
- B. Concrete Encasement: Where piping under roadways is less than 2'-6" below surface of roadway, provide 4" base slab of concrete to support piping. After piping is installed and tested, provide 4" thick encasement (sides and top) of concrete before backfilling. Provide Class 2500 concrete for encasement and slab.
- C. Previous Excavations: Where piping crosses over an area more than 5' wide which has been previously excavated to a greater depth than required for the piping installation, provide suitable subsidence-proof support for the piping. Comply with the details shown, or where not otherwise shown, provide the following support system:
  - 1. Excavate to undisturbed soil, in a width equal to the pipe diameter plus 2'. Install 8" courses of subbase material, each compacted to 95% of maximum density, as required to fill excavation and support piping.

### 3.10 BACKFILLING

- A. Do not backfill until installed mechanical work has been tested and accepted wherever testing is indicated. Install drainage fill where indicated, and tamp to a uniform firm density. Backfill with finely-graded subbase material to 6" above wrapped, coated and plastic piping and tanks, and to center line of other tanks (where recommended by tank manufacturer, use "pea gravel" backfill). Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to the required densities. Do not backfill with frozen materials.

### 3.11 CLEANING

- A. General: Clean all dirt and construction dust and debris from all mechanical piping systems and leave in a new condition. Touch up paint where necessary.
- B. Disinfection of Domestic Water Piping System:
  - 1. Prior to starting work, verify system is complete and clean.
  - 2. Open all drains and fixtures valves in the building starting with the valve nearest the water service line and permit the water to run clear for 10 minutes to eliminate grease, cuttings, flux, and foreign matter.
  - 3. Disinfect piping system in accordance with ANSI/AWWA C651-92 standard.
  - 4. Take samples from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C601. If any sample fails the analysis, repeat the procedure.
  - 5. Include a copy of the bacteriological analysis in the Operating and Maintenance manuals.
- C. Sanitary and Storm Drainage System:
  - 1. Remove construction debris from cleanouts, drains, strainers, baskets, traps, etc., and leave same accessible and operable. Place plugs in the end of uncompleted piping at the end of the day or whenever work stops.
  - 2. Clear the interior of sewer piping of dirt and other superfluous material as the work progresses. Maintain a swab or drag in the line and pull past each mortared joint as it is completed. In large, accessible conduit, brushes and brooms may be used for cleaning. Flush lines between manholes to remove collected debris.
  - 3. Before final acceptance of completed sewer system, flush and clean the entire system with water. Trap and remove solid material obtained from flushing and cleaning from the new system. Do not allow debris to enter the existing sewer system.
- D. Propane Gas, Compressed Air, and Vacuum Piping: Blow clear of debris with nitrogen or oil free air. Clean all low point strainers and pockets.
- E. Refrigeration System Piping: If, for any reason, sanitized and sealed-at-the-mill tubing is not used, clean the tubing as follows:
  - 1. Wipe each tube internally with a dry, lintless cloth followed with a clean lintless cloth saturated with recommended refrigerant.
  - 2. Repeat until the saturated cloth is not discolored by dirt.

3. Wipe with a clean cloth saturated with compressor oil and squeezed dry.
4. Wipe with a dry, lintless cloth.

### 3.12 TEST

#### A. General:

1. Minimum duration of two hours or longer, as directed for all tests. Furnish report of test observation signed by qualified inspector. Make all tests before applying insulation, backfilling, or otherwise concealing piping or connecting fixtures or equipment. Where part of the system must be tested to avoid concealment before the entire system is complete, test that portion separately, same as for entire system.
2. Provide all necessary temporary equipment for testing, including pump and gauges. Remove control devices before testing and do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for the indicated pressure and time.
3. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

#### B. Repair:

1. Repair piping system sections which fail the required piping test by disassembly and re-installation, using new materials to the extent required to overcome leakage. Do not use chemical stop-leak compounds, solder, mastics, or other temporary repair methods.
2. Drain test water from piping systems after testing and repair work has been completed.

C. Sewer: Furnish all facilities and personnel for conducting the test. Test in accordance with the requirements of the State Plumbing Inspector and local authorities.

D. Plumbing Waste and Vent Piping: Hydrostatic test by filling to highest point, but not less than 10' water column on major horizontal portion.

E. Water Piping: Hydrostatic pressure of 100 psig without loss for four hours.

F. Tanks and Equipment: Hydrostatic pressure to 1.5 times operating pressure but do not exceed maximum rated pressure.

G. Propane Gas Piping: One half hour minimum air at 60 psig for 2 psig gas, and 15 minutes at 10 psig for 7" water gauge natural gas or as approved and certified by serving utility.

#### H. Refrigerant System:

1. When the refrigerant connections have been completed, close the compressor suction and discharge valves (or receiver outlet valve in the case of condensing unit) and test the balance of the system to near operating pressure with a dry nitrogen.

2. Carefully test all joints, using soap and water or other sudsing solution. After all joints are tested, discharge the gas and repair all leaks, then repeat the test with a mixture of nitrogen and HCFC-22 and a halide torch or an electronic leak detector.
3. Evacuate the system to remove moisture and non-condensables. Lower the absolute pressure with a vacuum pump to 1000 microns of mercury. Apply external heat as required to vaporize moisture.
4. Dehydrate each refrigerant circuit by satisfactory use of a vacuum pump before charging with refrigerant. Furnish all necessary refrigerant and oil for complete operating charge of the system. Upon completion of the work of construction, test all refrigeration equipment under normal operating conditions and leave in operating order. Adjust automatic temperature controls.
5. After the first 24 hours of operation, measure the pressure drop across the suction filter. If the pressure drop exceeds 5 pounds per square inch, replace the cartridge with a new one, retesting and replacing the cartridge and/or adjusting the system as necessary to achieve a pressure drop of less than 5 pounds per square inch in 24 hours.

### 3.13 SUPERVISION AND START-UP

- A. Adjust flush valves, pressure reducing valves, mixing valves, water heater thermostats, domestic hot water circulating system balancing valves, and similar equipment.
- B. The installation, start-up, and adjustment of the Thermostatic mixing valve shall be supervised by an authorized agent of the manufacturer. The manufacturer's agent shall check out and approve the installation and shall also approve and be responsible for adjusting the operating and control system and instructing the Owner's representatives on the system operation.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. The requirements of this section apply to the plumbing equipment.
- B. Provide plumbing equipment specified and shown on the Drawings.
- C. Related Work: The requirements of Section 22 05 00, Common Plumbing Materials and Methods, also apply to this section.

### 1.2 QUALITY ASSURANCE

- A. Code: Comply with requirements of the Oregon State Plumbing Specialty Code.
- B. All equipment and component parts shall conform to governing codes. Gas-fired equipment shall be design certified by AGA.
- C. Labeling: All equipment shall have permanent labels affixed by the manufacturer listing model number, capacity, efficiency, approvals, and similar characteristics of the product.

## PART 2 - PRODUCTS

### 2.1 PIPING

- A. Piping, fittings, pumps, and related items are specified in Section 22 10 00.

### 2.2 ELECTRIC STORAGE WATER HEATERS

- A. Light Commercial Electric Storage Water Heater:
  - 1. UL approved and complying with the State Energy Code and ASHRAE 90.1-1999 requirements with adjustable automatic thermostatically controlled electric insertion elements constructed to withstand 400 degrees F without failure. Heavy glass-lined steel tank with magnesium anode, heat traps, not less than 1-1/2" of non-organic insulation and factory enameled jacket. Install with ASME Code pressure-temperature relief valve and hose bib drain. Capacity as shown on Drawings.
  - 2. Manufacturers: State, Ruud, Rheem, Bradford White, A.O. Smith, Republic, American, or approved substitute.

### 2.3 WATER HEATER ACCESSORIES

- A. Water Heater and Tank Seismic Restraints: For water heaters and tanks, Watts "Spacemaker", Holdrite "Quickstrap," or approved.
- B. Water Heater Stands: Galvanized steel stands with anchoring clips for attachment to wall or floor. Watts "Spacemaker", Holdrite, or approved.

- C. Water Heater mounting bracket: Wall or ceiling mounted water heater support assembly with seismic restraints. Watts "Spacemaker, Holdrite, or approved.
- D. Domestic Hot Water Expansion Tank: Plastic lined drawn steel tank for potable water with epoxy exterior finish, air charging valve and system piping connection. Butyl rubber diaphragm with steel retaining ring. Base mounting ring on sizes over 5 gallons. ASME construction on sizes over 10 gallons. Provide with relief valve where working pressure rating is less than 150 psi.

### PART 3 - EXECUTION

#### 3.1 UTILITY SERVICE

- A. Plumbing Utility Connections: Complete installation. Verify rough in dimensions of equipment prior to installing piping.

#### 3.2 EQUIPMENT INSTALLATION AND CONNECTION

- A. All equipment shall be installed plumb and level unless otherwise recommended by the manufacturer.
- B. Arrange piping connections to equipment to allow removal and replacement of the equipment without disassembly of connecting piping. Provide valves, unions, flanges, etc. at connection points.
- C. Arrange equipment for adequate service access as recommended by the manufacturer and as required by code.
- D. Anchor equipment to resist displacement due to seismic events as detailed on the drawings, recommended by the manufacturer, and as required by code and as specified in other sections of these specifications. Provide seismic straps as specified above for tank type water heaters.
- E. Install drain pans under all water heaters as specified in Section 22 05 00.

#### 3.3 EQUIPMENT CLEANING

- A. Remove construction and shipping protection and thoroughly clean all plumbing equipment just prior to building acceptance.

#### 3.4 SUPERVISION AND START-UP

- A. Do not place equipment onto operation until required work of other trades is complete, e.g. venting systems, combustion air ducts, etc.
- B. Follow manufacturer's instructions for start-up and adjustment of equipment.
- C. The installation, start-up, and adjustment of the power water heater shall be performed by an authorized agent of the manufacturer. The manufacturer's agent shall check out and approve the installation and shall also approve and be responsible for adjusting the operating and control system and instructing the Owner's representatives on the system operation.



END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. The requirements of this section apply to the plumbing fixtures and trim.
- B. Provide fixtures as shown on the Drawings and specified herein. Provide all required fixture trim and accessories for a complete, finished installation.
- C. Related Work: The requirements of Section 22 05 00, Common Plumbing Materials and Methods, also apply to this section.

### 1.2 QUALITY ASSURANCE

- A. Code: Comply with requirements of the Oregon State Plumbing Specialty Code.
- B. Fixture color: White unless indicated otherwise.
- C. Potable Water Valves: Potable water valves not limited to faucets, mixing valves, or pressure reducing valves. Valves shall meet NSF Standard 61, Section 9, for drinking water faucets and shall be brass construction. Brass components which contact water within the faucet shall be from brass which contains no more than 3 percent lead by dry weight.

## PART 2 - PRODUCTS

### 2.1 PIPING

- A. Piping, fittings, and related items as specified in related Sections 22 10 00.

### 2.2 INTERIOR PLUMBING MATERIALS

- A. Shock Arrester: Precharged bellows or sealed piston type manufactured to meet PDI WH-201 and ASSE 1010 Standards. Size in accordance with PDI procedures. J. R. Smith, PPP, Sioux Chief, Wade, Zurn, Watts, Josam, or approved substitute.
- B. Traps: Except chrome plated fixture traps. Recessed drainage pattern for threaded pipe and same grade as pipe for cast iron pipe; with cleanout plugs in trap body in all above grade locations.
- C. Handsink Tempering Valve: Pressure compensating water mixing valve. Precision Plumbing Products "Tempera" valve or approved substitute.
- D. Secondary piping supports: Install manufactured secondary piping supports for support and positioning of fixture rough-in piping from framing members. Hubbard, Sioux-Chief, or approved substitute.

### 2.3 PLUMBING FIXTURES AND TRIM

- A. Stops: Furnish stop valves for all fixtures. Screwdriver style, in wall, angle or straight through pattern to fit installation. Stops to be all brass with full turn brass stem and replaceable washer, no plastic. Compression nuts to be high copper content brass. Finish to be copper nickel chrome plate. Product to carry manufacturer's name. Risers to be chrome plated copper. Provide chrome plated shallow escutcheons. McGuire, Chicago, Brasskraft, Keeney, Zurn, or approved substitute.
- B. Fixture Traps: Exposed fixture tailpieces, traps, and wastes shall be chrome plated 17 gauge seamless brass tube with cast brass nuts and deep or box style escutcheons as required to conceal rough piping. Products to be stamped with manufacturer's name and material gauge. McGuire, Keeney, Zurn, or approved.
- C. 1.6 Gallon, Water Closet, Tank Type, Vitreous China, "WC-": Water closet shall be specifically designed for 1.6 gallon siphon jet flush.
  - 1. Seat: Solid white heavy weight molded plastic seat, with molded-in bumpers; open front less cover for elongated bowl with check and self-sustaining hinge. Hinge and hardware to be 300 series stainless steel. Church 295-SSC, Beneke 523-SS/CH-B, Bemis 1955 SS/C, or Zurn Z5956SS-EL-STS.
  - 2. Floor Mounted, 18" High "WC-1": American Standard 2998.010, or Kohler K-3427, Eljer 091-0285.
- D. Lavatory, Vitreous China:
  - 1. Faucet: Chrome plated brass body with handle for the handicapped, vandal resistant 0.5 gpm aerator, with grid strainer waste. Delta 516WF HGM HDF, Grohe 33.024 w/07.542, Moen 8430 or Symmons S20-2G-FR-W.
  - 2. Wall Hung, 20" x 18" Size "LV-1": Provide with concealed arm hangers and wall backing plate (J.R. Smith, Josam, Wade, Watts, or Zurn). American Standard 0355.012, Kohler K-2005, or Eljer 051-2104.
- E. Fixtures Furnished by Owner (and/or Under Another Section): Some fixtures will be furnished by the Owner (and/or under another specification section). Include under this section the required rough-ins, 3/8" chrome plated supplies with stops, 1-1/2" chrome plated cast brass "P" trap (or, on kitchen sinks, 2" cast iron "P" traps) for each sink compartment, and make final connection. Verify all rough-ins and connection requirements before commencing work.

### PART 3 - EXECUTION

#### 3.1 PIPING

- A. Install in accordance with Section 22 10 00.

#### 3.2 FIXTURE INSTALLATION AND CONNECTION

- A. All exposed fixture hardware and piping shall be plated with polished chrome unless otherwise directed in these specifications. Where chair carriers or special carrier design are not indicated, provide 3/16" thick by 6" wide steel to waste or vent piping and to available building construction.

- B. All fixtures in contact with finished walls and floors shall be caulked with waterproof, white, non-hardening sealant which will not crack, shrink or change color with age.
- C. All fixtures and component parts shall conform to governing codes.
- D. All fixtures shall be securely mounted level and plumb or as recommended by the manufacturer. Mount fixtures intended to be accessible to the handicapped at the dimensions required by code.

### 3.3 STARTUP

- A. Adjust flush valves, pressure reducing valves, mixing valves, water heater thermostats, hot water circulating system balancing valves, and similar equipment.
- B. Remove construction protection, tags and labels and thoroughly clean all plumbing equipment and trim. Scour all fixtures just prior to building acceptance.

### 3.4 GAS SERVICE

- A. Contact propane gas company service as required and pay all costs involved. Run all gas distribution piping and make final connections to all gas using equipment. Install regulators to deliver proper inlet pressures and vent regulators to outside where required.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The provisions of the General Requirements, Supplementary Requirements, and Division 1 apply to the HVAC work specified in this Division.
- B. The requirements of this Section apply to the HVAC systems specified in these Specifications and in other Division 23 sections.
- C. Provide all items, articles, materials, equipment, operations and/or methods listed, mentioned, shown and/or scheduled on the Drawings and/or in these Specifications, including all labor, supervision, services, permits, fees, and incidentals necessary and required to provide a complete and operable facility with complete systems as shown, specified, and required by applicable codes.
- D. The work shall include, but not be limited to, the following systems:
  - 1. Fuel supply system.
  - 2. Central heating and cooling equipment.
  - 3. Complete piping systems including insulation, valves, supports, etc.
  - 4. Air handling equipment including packaged equipment and exhaust fans.
  - 5. Air distribution systems including ductwork, terminal units, dampers, insulation, and air inlets and outlets.
  - 6. HVAC control system.
  - 7. Special systems as specified herein.
- E. Advise subcontractor, suppliers, and vendors involved in the work specified in this Section of the applicable requirements.

1.2 QUALITY ASSURANCE

- A. All work and materials shall conform to all applicable local and state codes and all federal, state and other applicable laws and regulations. All clarifications and modifications which have been cleared with appropriate authorities are listed under the applicable sections. All electrical products shall bear the label of a recognized testing laboratory such as UL or CSA..
- B. Whenever the requirements of the Specifications or Drawings exceed those of the applicable code or standard, the requirements of the Specifications and Drawings shall govern.
- C. Codes and Standards: Comply with the provisions of the following referenced codes, standards and specifications:
  - 1. Federal Specifications (FS)
  - 2. American National Standards Institute (ANSI)
  - 3. National Electrical Manufacturer's Association (NEMA)
  - 4. National Fire Protection Association (NFPA)
  - 5. Underwriters Laboratories, Inc. (UL)
  - 6. Factory Mutual (FM)
  - 7. International Building Code (IBC) with State and Local Amendments

8. International Mechanical Code (IMC) with State and Local Amendments
  9. Uniform Plumbing Code (UPC) with State and Local Amendments
  10. American Society for Testing and Materials (ASTM)
  11. Americans with Disabilities Act (ADA)
  12. International Fire Code (IFC) with State and Local Amendments
  13. Energy Policy Act (EPAct)
  14. Manufacturers Standardization Society (MSS)
  15. American Gas Association (AGA)
- D. Each piece of equipment furnished shall meet all detailed requirements of the Drawings and Specifications and shall be suitable for the installation shown. Equipment not meeting all requirements will not be acceptable, even though specified by name. Where two or more units of the same class of equipment are furnished, use product of the same manufacturer; component parts of the entire system need not be products of same manufacturer. Furnish all materials and equipment, new and free from defect and of size, make, type and quality herein specified or approved by the Architect. All materials shall be installed in a neat and professional manner.
- E. All apparatus shall be built and installed to deliver its full rated capacity at the efficiency for which it was designed.
- F. The Drawings and Specifications are complementary. What is called for by one shall be as though called for by both.
- G. Drawings: Do not scale drawings for roughing-in measurements, nor use as shop drawings. Make field measurements and prepare shop drawings as required. Coordinate work with shop drawings of other specification divisions.
- H. Field Wiring: It is the intent of these specifications that all systems shall be complete and operable. Refer to all drawings and specifications, especially the electrical drawings, to determine voltage, phase, circuit ampacity and number of connections provided. Provide all necessary field wiring and devices from the point of connection indicated on the electrical drawings. All equipment shall be installed in compliance with the Electrical Code and the equipment's UL listing. Bring to the attention of the Architect in writing, all conflicts, incompatibilities, and/or discrepancies prior to bid or as soon as discovered.

### 1.3 WORK OF OTHER CONTRACTS

- A. Work under this contract shall be conducted in a manner to allow for the future installations of such equipment or items listed in other sections of this Specification.

### 1.4 WORK OF OTHER DIVISIONS

- A. Work under this Division shall be conducted in a manner to cooperate with the installation of such equipment or items as specified in other Divisions.
- B. Plumbing piping systems and fixtures and fire suppression piping systems are specified under other Divisions of these Specifications except for provisions or items specifically noted on the Drawings or specified herein.

- C. Consult all Drawings and Specifications in this project and become familiar with all equipment to be installed. Coordinate all aspects of the construction with the other trades on the job to ensure that all work and materials required to provide a complete and operational facility are included in the bid.
- D. All sections of Division 23 are interrelated and shall be considered in their entirety when interpreting any material, method, or direction listed in any section of Division 23. Individual sections are not written for specific subcontractors or suppliers but for the general contractor.

1.5 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES (SUBMITTALS)

- A. Submit in accordance with Division 1 full technical and descriptive shop drawing data on proposed materials and equipment as detailed in each section.
- B. The Contractor shall verify that all equipment submitted can be delivered and installed within the time constraints of the construction period.
- C. Include the manufacturer, type, style, catalog number, complete specification, certified dimensions, and description of physical appearance for each item and option submitted. Reproduction of catalog data sheets shall be clean and legible to show all details, including gauge of metal used.
- D. Include only information on exact equipment to be installed, not general catalogs of the manufacturer. Where sheets show proposed equipment as well as other equipment, identify proposed equipment with rubber stamp arrow or similar concise method.
- E. Submit with each copy a transmittal letter verifying that all included equipment submittals have been carefully considered for quality, dimensions, function, and have been coordinated with the Drawings and Specifications. Guarantee that proposed materials will meet or exceed the quality and function of those specified.
- F. Include field wiring diagrams and connection diagrams for all control and/or low voltage systems, including floor plans.
- G. Submittal Review: The submittal review process is a means to provide quality control. The action noted to be taken (or where conflicts with the contract documents are not noted) shall not be interpreted by the Contractor as automatic "change orders." Approval of the data for substitution and shop drawings shall not eliminate the contractor's responsibility for compliance with Drawings or Specifications, nor shall it eliminate the responsibility for freedom from errors of any sort in the data discovered prior to or after the review process. Deviations, discrepancies, and conflicts between the submittals and the Contract Documents shall be called to the Architect's attention in writing at the time of transmittal of the data.
- H. Unless otherwise directed by Division 1, submittal data shall be in a 3-ring plastic binder with a clear plastic sleeve and a project identification sheet inserted. Arrange submittals numerically with specification sections identified on divider tabs. All required sections shall be submitted at one time.

1.6 PRODUCT SUBSTITUTION

- A. Materials other than those specified may be approved for this project providing a written request is submitted to the Architect prior to bid in accordance with Instructions to Bidders. Requests shall include complete specifications, dimensions, manufacturer and catalog number for each item for which approval is desired. If, in the opinion of the Architect, the material is not complete or if it is not an acceptable substitute, he may reject it. The Architect's evaluation will be based solely on the material submitted.

1.7 CHANGE ORDERS

- A. All supplemental cost proposals by the Contractor shall be accompanied by a complete itemized breakdown of labor and materials without exception. At the Architect's request, the contractor's estimating sheets for the supplemental cost proposals shall be made available to the Architect. Labor must be separated and allocated for each item of work.

1.8 RECORD DOCUMENTS

- A. Project Record (As-Installed) Drawings:
  - 1. Maintain a set of record drawings on the job site as directed in Division 1.
  - 2. Keep Drawings clean, undamaged, and up to date.
  - 3. Record and accurately indicate the following:
    - a. Depths, sizes, and locations of all buried and concealed piping dimensioned from permanent building features.
    - b. Locations of all valves with assigned tag numbers.
    - c. Locations of all fire dampers and other airflow control devices.
    - d. Changes, additions, and revisions due to change orders, obstructions, etc. Eradicate extraneous information.
    - e. Model numbers of installed equipment.
  - 4. Make Drawings available when requested by Architect for review.
  - 5. Submit as part of the required Project Closeout documents. Final submittal will be in the form of reproducible drawings.
  - 6. Quality of entire set of project record drawings to match the quality of the contract documents; quality to be judged by Architect. Computer-aided design drafting (CADD) shall be used to complete project record drawings. Use standards set in contract documents. Note field modifications, all addenda, and change order items on project record drawings. If deficiencies are found in either the quality or the accuracy of the drawings, they will be returned unapproved. Additional review of subsequent submissions shall be at the contractor's expense.
- B. Operating and Maintenance Manuals: Submit five (5) sets of Operating and Maintenance Instructions, including manufacturer's service data, wiring diagrams, and parts lists and vendors for all serviceable items of equipment, valve charts, balancing data, final control diagrams showing final set points, and any additional equipment added by change order, bound in three-ring, vinyl or canvas covered, loose-leaf binders organized with index and thumb-tab markers for each classification of equipment or data. Comply with provisions of Section 01700 where applicable to the mechanical work.



- C. Instruction Manual: Submit separate Instruction Manual 30 days prior to scheduling the required Instruction Period. Include the following:
1. Description of each system and operational sequences.
  2. Seasonal system adjustments.
  3. Description and normal settings for time clocks, thermostats, fan and other motor switches, etc.
  4. Normal valve settings.
  5. Emergency measures upon system failure.
  6. Cross reference information furnished by manufacturer in the Operating and Maintenance Manual above.

## 1.9 WARRANTY

- A. Furnish, prior to application for final payment, three copies of written and signed guarantee effective a period of one year from date of completion and acceptance of entire project; agree to correct, repair and/or replace defective materials and/or equipment or the results of defective workmanship without additional expense to the Owner. Where no response satisfactory to the Owner has occurred within three working days from the written report of a warranty covered defect, the contractor shall agree to pay for the cost of repair of the reported defect by a contractor of the Owner's choice.
- B. Where the manufacturer's guarantee exceeds one year, the longer guarantee shall govern and include the Contractor's labor.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. General: Provide all new materials and equipment, identical to apparatus or equipment in successful operation for a minimum of two years. Provide materials of comparable quality omitted here but necessary to complete the work. Maximum allowable variation from stated capacities, minus 5% to plus 10% as approved in each case.
- B. Compatibility: Provide products which are compatible with other portions of the work and provide products with the proper or correct power and fuel-burning characteristics, and similar adaptations for the project.
- C. Efficiency: Heating and cooling equipment shall comply with ASHRAE Standard 90.1-2001 and the State Energy Code. Where equipment efficiencies are indicated, the use of alternate or substitute manufacturer's equipment with lower efficiencies is not permitted.
- D. Storage and Handling:
1. Delivery: Deliver to project site with manufacturer's labels intact and legible.
  2. Handling: Avoid damage.
  3. Storage: Inside protected from weather, dirt and construction dust. Where necessary to store outside, elevate well above grade and enclose with durable, waterproof wrapping.

## 2.2 MOTORS

- A. General: Motors shall conform to UL, CSA, and NEMA MG-1 and bear a permanently attached nameplate indicating compliance and motor characteristics. Provide motors meeting UL 507 standard where applicable.
- B. Manufacturers: General Electric, Lincoln, Baldor, Wagner, Westinghouse, US Motors/Emerson or accepted substitute. Where selection of motor manufacturer is within Contractor's control (independent of equipment selection), provide motors produced by a single manufacturer to the greatest extent possible.
- C. Temperature Rating: Class B insulation, except where otherwise indicated or required for service indicated.
- D. Starting Capability: As required for service indicated, but not less than 5 starts per hour.
- E. Phases and Current: 1/3 horsepower and smaller capacitor-start, capacitor-run single-phase; 1/2 horsepower and larger, squirrel-cage induction polyphase. Coordinate with actual current characteristics; specified in Division 16 and use no 230/460 voltage motors on 208 voltage power or vice versa.
- F. Service Factor: 1.15 for polyphase; 1.25 for single-phase.
- G. Construction: General purpose, continuous duty; NEMA design "B," except "C" for high starting torque applications.
- H. Frames: For single phase motor sizes NEMA No. 48, except 56 for heavy-duty applications. NEMA "T" frames for 1 horsepower and larger polyphase motors. Special frame types as required for close coupled pumps and similar applications.
- I. Bearings: Ball or roller, and design for thrust where applicable; double shielded and regreasable, except provide permanently sealed where not accessible for greasing. Sleeve-type bearings permitted only where indicated for fractional (1/6 hp or less) horsepower motors with direct drive loads. Minimum L-10 bearing life of 40,000 hours when used with minimum pitch sheaves per NEMA Table 14-1.
- J. Enclosure Type: Unless otherwise indicated, open drip-proof for normal concealed indoor use, guarded where exposed to employees or occupants. Type II for outdoor use, except weather-protected Type I where adequately housed. Totally enclosed where explosion proof motors are required.
- K. Overload Protection: Built-in thermal with internal sensing device for stopping motor, and for signaling where indicated on single phase motors.
- L. Speed: Not faster than synchronous speeds of 1,800 RPM except on some pumps as approved in each case.

- M. Efficiency: The manufacturer's highest (NEMA premium) efficiency motors tested under procedures recommended by NEMA MG-1 (IEEE Standard 112, Test Method B). Intermittent duty motors, operating less than 6 hours per day, shall comply with EPA/EISA standards. Submit manufacturer's data if motor nameplate does not indicate minimum efficiency. Nominal full load efficiencies for 460 volt, 1,800 rpm motors:

<u>HP</u>	<u>Efficiency %</u>
1-1/2	87.5
2	89.5
3	89.5
5	89.5
7-1/2	91.0
10	91.7
15	93.0
20	93.0
25	93.6

- N. Inverter Duty Motors: Where motors are controlled by an adjustable frequency drive, provide motors labeled "Inverter Duty," complying with NEMA MG1-31, and meeting the requirements of the adjustable frequency drive manufacturer.

### 2.3 STARTERS AND SWITCHES

- A. Manufacturers: General Electric, ITE, Allen Bradley, Square D, Cutler-Hammer, Cerus Industrial or accepted substitute. Provide starters by same manufacturer throughout project.
- B. General: Provide each motor with starter or switch as approved and recommended by manufacturer of motor or equipment of which motor is a part.
- C. Starter Characteristics: Type I general purpose enclosure with padlock ears and supports for mounting as indicated. Starter type and size as recommended by motor manufacturer. Use no starter smaller than NEMA Size 1.
- D. Manual Switches: Provide on motors 1/3 horsepower and smaller except where automatic control or interlock is indicated. Include pilot light. Provide overload protection where not protected by internal motor overload protection.
- E. Magnetic Starters: Provide for 1/2 horsepower and larger motors, and for smaller motors on automatic control or with interlock switch. Full voltage, across the line, single speed, non-reversing except where otherwise required. Include power on and running pilot lights, on-off-auto selector switch, external reset button, overload relay on each phase, and devices for coordination with control system (including fused transformer for control circuit). Provide automatic ambient temperature compensation for starter heaters.

### 2.4 GUARDS

- A. Provide guards in accordance with State Safety Code and OSHA requirements over all rotating equipment including belts, shafts and couplings. Drive guards over belts and sheaves shall include 2-1/2" diameter access opening at shaft ends for speed counter.

### 2.5 DRIVES

- A. Acceptable Manufacturers: Dayton, Gates, Browning.
- B. General: "V" section belt drives, multiple as required. Provide variable pitch motor sheaves on all one or two belt drives and standard slide rails or approved means of adjustment for each motor with belt drive. Use standard section belts and no sheave smaller than cataloged industry standard; provide countersunk center on shaft ends to receive speed counter tip.
- C. Selection: Size drive components based on 1.5 times installed motor horsepower. Where variable frequency drives are provided to modulate motor speed, select drives to allow application of full motor horsepower to the connected load at 60 hertz drive output, up to the maximum rated operating speed of the driven load.

## 2.6 SOLID-STATE, VARIABLE-SPEED MOTOR CONTROLLERS

- A. General: Controllers listed and labeled as a complete unit and arranged to provide variable speed of a standard NEMA Design B 3-phase induction motor by adjusting output voltage and frequency of controller. Designed and rated by the manufacturer for the type of load (e.g., fans, blowers, and pumps) used and also approved by the manufacturer for the type of connection used between the motor and load (direct connection or power transmission connection).
- B. Input Line Reactors: 5% for reduction of harmonics.
- C. Output Line Reactors: Specially designed and constructed for IGBT controllers and designed to protect motor from voltage spikes over 150% of the bus voltage. Required where controller to motor cable length exceeds 50 feet. Provide dV/dT filters for 460 volt motors with extreme cable lengths.
- D. In lieu of providing line reactors, the drive manufacturers may submit a power system analysis demonstrating compliance with IEEE 519.
- E. Ratings:
  - 1. Output Ratings: 3-phase, 6 to 60 Hz, with voltage proportional to frequency throughout the voltage range.
  - 2. Starting Torque: 100 percent of rated torque, or as indicated.
  - 3. Speed Regulation: Plus or minus 1 percent.
  - 4. Ambient Temperature: 0° C to 40° C.
  - 5. Efficiency: 95 percent minimum features shall at full load, 60 Hz.
- F. Isolated Control Interface: Allow the controller to follow one of the following over an 11:1 speed range:
  - 1. Electrical Signal: 4 to 20 milliamperes at 24 V.
  - 2. Pneumatic Signal: 3 to 15 psig.
- G. Internal Adjustability: Provide the following internal adjustment capabilities:
  - 1. Minimum Speed: 5 to 25 percent of maximum RPM.
  - 2. Maximum Speed: 80 to 100 percent of maximum RPM.
  - 3. Acceleration: 2 to 22 seconds.
  - 4. Deceleration: 2 to 22 seconds.
  - 5. Current Limit: 50 to 110 percent of maximum rating.

- H. Self-Protection and Reliability Features:
  - 1. Input transient protection by means of surge suppressors.
  - 2. Snubber networks to protect against malfunction due to system voltage transients.
  - 3. Motor Overload Relay: Adjustable and capable of NEMA class 10 performance.
  - 4. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
  - 5. Instantaneous Overcurrent Trip.
  - 6. Loss of Phase Protection.
  - 7. Reverse Phase Protection.
  - 8. Under- and Over-Voltage Trips.
  - 9. Overtemperature Trip.
  - 10. Short Circuit Protection.
  
- I. Automatic Reset/Restart: Attempt three restarts after controller fault or on return of power to the system following an interruption and before shutting down for manual reset or fault correction. Provide for restarting during deceleration without damage to the controller, motor, or load.
  
- J. Operation and Maintenance Features: Include:
  - 1. Status Lights: Door-mounted LED indicators to indicate power on, run, overvoltage, line fault, overcurrent, and external fault.
  - 2. Elapsed Time Meter.
  - 3. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer.
  - 4. Current-Voltage-Frequency Indicating Devices: Mount meters or digital readout device and selector switch flush in controller door and connect to indicate controller output.
  - 5. Manual Bypass: Magnetic contactor arranged to safely transfer the motor from the controller to the power line, or from the line to the controller while the motor is at zero speed. Include Controller-Off-Bypass selector switch and indicator lights to indicate mode selection.
  - 6. Integral Main Disconnect: Circuit breaker connected to shut down all power to both the controller and the bypass. Interlock breaker with cabinet door.
  - 7. Isolating Circuit Breaker: Arranged to electrically isolate the variable-speed controller to permit safe troubleshooting and testing of the controller, both energized and de-energized, while the motor is operating in the bypass mode.
  
- K. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. ABB Power Distribution, Inc.
  - 2. Allen-Bradley Co.
  - 3. Furnas Electric Co.
  - 4. General Electric Co.
  - 5. Graham
  - 6. Reliance Electric Co.

7. Square D Co.
8. Westinghouse Electric Corp.
9. Cerus Industrial
10. Honeywell International Inc.

## 2.7 ACCESS PANELS

- A. Manufacturers: Inryco/Milcor, Bilco, Elmdor, Karp, Potter-Roemer or accepted substitute. Inryco/Milcor Style DW, K, or M panels as required by construction.
- B. Construction: Flush style, fire rated in fire rated partitions and ceilings.

## 2.8 METERS AND GAUGES

- A. General: Install meters and gauges where shown on the plans or specified elsewhere in these specifications.
- B. Pressure-Temperature Test Plugs:
  1. ¼" or ½" NPT fitting of solid brass capable of receiving either an 1/8" OD pressure or temperature probe and rated for zero leakage from vacuum to 1000 psig. Neoprene valve core for temperatures to 200 deg. F., Nordel to 350 deg. F.
  2. Provide for each test plug a pressure gauge adapter with 1/16" or 1/8" OD pressure probe.
  3. Furnish a test kit containing one 2-1/2" dial pressure test gauge of suitable range, one gauge adapter with 1/16" or 1/8" OD probe and two 5" stem pocket test thermometers – one 0 to 220 degrees F and one 50 to 550 degrees F. Turn the kit over to the Architect.
  4. Cisco "P/T Plugs," Peterson "Pete's Plug" or approved substitute.
- C. Thermometers: Liquid-in-glass, adjustable stem, separable sockets, plus 40 to 240 degrees F range (unless indicated otherwise). Weiss numbers are listed. Equivalent Taylor, Trerice, Weksler or approved substitute.
  1. Wide case (9") in equipment rooms and all major equipment items. Weiss "9VS" series.
  2. Narrow case (7") in all other locations. Weiss "7VS" series.
- D. Pressure Gauges: Install on suction and discharge of all pumps and where shown on Drawings 4-1/2" dial, 0-100 psig graduation pressure gauges with Ashcroft No. 1106 pulsation dampers and stop cocks. Weiss UGE-1 or equivalent Ashcroft, Marsh, Trerice, Weksler.

## 2.9 VALVES

- A. General: Provide factory fabricated valves of the type, body material, temperature and pressure class, and service indicated. Bronze gate, globe and check valves shall comply with MSS-SP-80. Ball valves shall comply with MSS-SP-110. Iron gate and globe valves shall comply with MSS-SP-70. Iron check valves shall comply with MSS-SP-71. Butterfly valves shall comply with MSS-SP-67. Valve size same as connecting pipe size.

- B. Acceptable Manufacturers: Milwaukee, Crane, Grinnell, Nibco, Hammond, Stockham, Legend, Apollo, Watts, and Walworth. Grooved end valves Victaulic, Tyco-Grinnell, Gruvlock, or accepted substitute. NIBCO numbers are given except as noted. Where possible, provide valves from a single manufacturer.
- C. Valve Styles: See individual Division 23 sections for valve styles.
- D. Butterfly Valve Operators: Locking lever for shut-off service; "Memory Stop" for lever handle with 10-position throttling plate for throttling service; gear operator with babbitt sprocket rim for chain-operated valves and gear operators on all 8" or larger valves.
- E. Butterfly Valve Style: Lug-type with cap screws for all valves utilized for equipment isolation for servicing. Lug and grooved style valves shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full system pressure.
- F. Insulated Valves: Install extended-stem valves in all piping specified as insulated, and arrange in the proper manner to receive insulation.
- G. Multifunction Valves: Valves incorporating multiple functions including control valves, strainers, drain valves with retained caps, air vent valves, P/T ports, unions, pump flanges, check valves, and balancing valves are acceptable. Webstone, Nexus, Flow Design, Apollo, or accepted substitute.
- H. Mechanical Actuators: Provide mechanical actuators with chain operators where indicated, where valves 4" and larger are mounted more than 7' above the floor, and where manual operation is difficult because of valve size, pressure differential or other operating conditions. Drop chains to 6'-6" above the floor.
- I. Selection of Valve Ends (Pipe Connections): Select and install valves with ends matching the types of pipe/tube connections.

## 2.10 HANGERS AND SUPPORTS

- A. General: Provide factory-fabricated horizontal piping hangers, clamps, hanger rod, inserts, supports, etc., of the indicated MSS type and size. The Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry Practice SP-58 and SP-69 are referenced in this section.
- B. Manufacturers: B-Line, Carpenter & Paterson, Grinnell, Michigan, Superstrut, Tolco, Erico, or accepted substitute. Grinnell figure numbers in parentheses where applicable (or other manufacturers as noted).
- C. Corrosion Protection: Provide materials which are zinc plated or factory painted to prevent corrosion. Prevent electrolysis in the support of copper tubing by the use of hangers and supports which are copper plated, plastic coated, or by other recognized industry methods.
- D. Seismic Requirements: Provide seismic restraints in accordance with OSSC Section 1613. Design restraint systems in accordance with "Seismic Restraint Manual: Guidelines for Mechanical Systems," Second Edition, 1998, SMACNA, or "A Practical Guide to Seismic Restraint" ASHRAE RP-812, 1999.

- E. Horizontal Piping Hangers and Supports:
1. Adjustable Clevis Hanger: MSS Type 1 (Fig. 260).
  2. Adjustable Band Hanger: MSS Type 7 (Fig. 97), fabricated from steel.
  3. Adjustable Swivel-Band Hanger: MSS Type 10 (Fig. 70).
  4. Clamp: MSS Type 4 (Fig. 212, 216).
  5. Double-Bolt Clamp: MSS Type 3 (Fig. 295A, 295H), including pipe spacers.
  6. Adjustable Saddle-Support: MSS Type 36 (Fig. 258) and MSS Type 37 (Fig. 259), including saddle, pipe and reducer. Fabricate base-support from steel pipe and include cast-iron flange or welded-steel plate.
  7. Channel Support System: Galvanized, 12 gauge channel and bracket support systems, single or double channel as indicated on the Drawings or as required by piping and equipment weights. Grinnell "Power Strut" channel. Acceptable Manufacturers: Super Strut, Globestrut, Bee, Kindorf or Unistrut.
- F. Vertical Pipe Clamps:
1. Two-Bolt Riser Clamp: MSS Type 8 (Fig. 261).
  2. Four-Bolt Riser Clamp: MSS Type 42 include pipe spacers at inner bolt-holes.
- G. Hanger Attachment:
1. Hanger Rod: Rolled threads, zinc plated. Right hand threaded.
  2. Turnbuckles: MSS Type 13 (Fig. 230).
  3. Weldless Eye-Nut: MSS Type 17 (Fig. 290).
  4. Malleable Eye-Socket: MSS Type 16 (Fig. 110R).
  5. Clevises: MSS Type 14 (Fig. 299).
- H. Building Attachments:
1. Concrete Inserts: MSS Type 18 (Fig. 282), steel or Grinnell Power-Strut PS349 continuous channel. Acceptable Manufacturers: Michigan Hanger, Globestrut, Unistrut, Super Strut.
  2. Clamps: MSS Type 19 (Fig. 285, 281), Type 20, 21 (Fig. 225, 226, 131), Type 23 (Fig. 86, 87, 88), Type 25 (Fig. 227), Type 27 through 30 where applicable.

## 2.11 IDENTIFICATION MARKERS

- A. Pipe Markers:
1. Adhesive pipe markers of width, letter size and background color conforming to ANSI A13.1.
  2. Acceptable Manufacturers: Brady B946 with arrow banding tape or similar Seaton, Zeston, MSI.
- B. Duct Markers:
1. Adhesive duct markers 2¼"x14" with black text indicating contents on white background with directional flow arrow.
  2. Acceptable Manufacturers: Brady B946 or similar Seaton, Zeston, MSI.



- C. Nameplates:
1. Engraved nameplates, 1/16" thick, laminated 2-ply plastic, bottom ply white, outer ply black, letters formed by exposing bottom ply.
  2. Size: 2" by 4" nameplates with 1/4" high letters.

- D. Valve Tags:
1. 2" diameter, 18-gauge polished brass tags with 3/16" chain hole and 1/4" high stamped, black-filled service designation.
  2. Acceptable Manufacturers: Seaton, Brady, MSI.

## 2.12 CONCRETE FOR MECHANICAL WORK

- A. Classes and Applications: Provide strength classes with the following cement content and water/cement ratios for the indicated applications and similar required applications:
1. 4000 psi Class: 565 pounds cement/yard (6.0 sacks); 0.57 water/cement ratio. Provide 4000 Class for tanks, vaults, beam-type foundations and similar structures.
  2. 3000 psi Class: 500 pounds cement/yard (5.25 sacks); 0.68 water/cement ratio. Provide 3000 Class for miscellaneous underground structural concrete, reinforced encasement, block type foundations (with smallest dimension at least 0.2 times largest dimension), curbs, pads, inertia blocks (unframed type), and similar structural support work.
  3. 2500 psi Class: 450 pounds cement/yard (4.75 sacks); 0.75 water/cement ratio. Provide 2500 Class for plain encasement, thrust blocks, filling steel-framed units, and similar work.
  4. Rough Grouting Class: 565 pounds cement/yard (6.0 sacks); 0.75 water-cement ratio; adjust aggregate sizes to facilitate placement. Use for rough grouting, not for setting equipment bases.
  5. Backfill Class (Lean Concrete): 375 pounds cement/yard (4.0 sacks); 0.87 water/cement ratio. Use for filling where excavations are extended below point of support for mechanical work.

## 2.13 PENETRATION FIRE STOPPING

- A. Through-penetration fire stopping system tested and listed by Underwriters Laboratories. 3M, Metacaulk, SpecSeal, or approved.
- B. Select system for proper application based on wall construction, type of penetrating item, wall rating, etc.

## PART 3 - EXECUTION

### 3.1 LAYOUT AND COORDINATION

- A. Site Examination: Before starting work, carefully examine site and all contract Drawings. Become thoroughly familiar with conditions governing work on this project. Verify all indicated elevations, building measurements, roughing-in dimensions and equipment locations before proceeding with any of the work.
- B. Utility Locations: The location of existing utilities, wires, conduits, pipes, ducts, or other service facilities are shown in a general way only on the Drawings and are taken from existing records. Ascertain whether any additional facilities other than those shown on the plans may be present and determine the exact location and elevations of all utilities prior to commencing installation.
- C. Sleeves, Inserts, Cast-in-Place Work: Provide sleeves, inserts, anchoring devices, cast-in-place work, etc. which must be set in concrete sequenced at the proper time for the project schedule.
- D. Coordination:
  - 1. The drawings are based on equipment of a certain manufacturer and may be identified as such. Where alternate manufacturers or approved substitutes are incorporated into the work, any required design changes are the responsibility of the contractor. Such changes may include changes in utility or system connection sizes, location, or orientation, service clearances, structural support or acoustic considerations.
  - 2. Where the work must be sequenced and positioned with precision in order to fit into the available space, prepare accurate scale shop drawings showing the actual physical dimensions required for the installation and submit prior to purchase/fabrication/installation of any of the elements involved in the coordination.
  - 3. Cooperate with other trades in furnishing material and information for sleeves, bucks, chases, mountings, backing, foundations and wiring required for installation of mechanical items.
  - 4. Coordinate all work with other trades and determine in advance where interfacing of the mechanical work and other work are required to be connected together. Provide all materials and equipment to make those connections. Submit shop drawings showing required connections where special conditions exist.
- E. Discrepancies: Report immediately any error, conflict or discrepancy in Plans, Specifications and/or existing conditions. Do not proceed with any questionable items of work until clarification of same has been made. Should rearrangement or re-routing of piping be necessary, provide for approval the simplest layout possible for that particular portion of the work.

### 3.2 UTILITY COORDINATION

- A. Utility Coordination: Coordinate all aspects of the incoming utility services indicated with the city engineer, serving utility, and the off-street improvements contractor. Requirements of the utility company which exceed the provisions made on the Drawings or covered by these Specifications shall take precedence. Provisions made on the Drawings or Specifications in excess of the utility company's requirements shall take precedence. No additional compensation will be allowed the contractor for connection fees or additional work or equipment not covered in the Drawings or Specifications which are a result of policies of the serving utilities.

### 3.3 CONTINUITY OF EXISTING SERVICES

- A. Existing water, power, heat, ventilation, air conditioning and other services shall remain in service during new construction work. Coordinate any interruption of these services with the Owner's representative a minimum of twenty-four (24) hours in advance. Arrange work to minimize number and extent of all interruptions.
- B. Protect from damage active utilities existing and evident by reasonable inspection of the site whether shown or not on the Drawings. Protect, relocate or abandon utilities encountered in the work which are not shown on the Drawings or evident by inspection of the work as directed by the Architect. Maintain continuity of all utility services to existing buildings.
- C. All necessary service interruptions of utilities shall be scheduled with the Director of Physical Plant. Minor interruptions will require a minimum of forty-eight (48) hours prior notification. Major shut down of any utility is to be scheduled between the hours of 5:30 p.m. and 6:00 a.m. and will require a minimum of seven (7) days prior notice.

### 3.4 MECHANICAL EQUIPMENT WIRING

- A. Provide all mechanical equipment motors, automatic temperature, limit, float and similar control devices required, with wiring complete from power source indicated on Electrical Drawings.
- B. Provide properly rated motor overload and undervoltage protection and all manual or automatic motor operating devices for all mechanical equipment.
- C. Equipment and systems shown on the Drawings and/or specified, are based upon requirements of specific manufacturers which are intended as somewhat typical of several makes which may be approved. Provide all field wiring and/or devices necessary for a complete and operable system including controls for the actual selected equipment/system.
- D. Provide all starters for mechanical motors. Review Electrical Specifications and Drawings to determine which mechanical motor starters will be provided under the Electrical Specification Sections and provide all others.

### 3.5 GENERAL INSTALLATION

- A. Locating and Positioning Equipment: Observe all Codes, Regulations and good common practice in locating and installing mechanical equipment and material so that completed installation presents the least possible hazard. Maintain adequate clearances for repair and service to all equipment and comply with Code requirements.

- B. Arrangement: Arrange piping parallel with primary lines of the building construction, and with a minimum of 7' overhead clearance in all areas where possible. Unless indicated otherwise, conceal all piping. Locate operating and control equipment properly to provide easy access, and arrange entire mechanical work with adequate access for operation and maintenance. Give right-of-way to piping which must slope for drainage. Set all equipment level or as recommended by manufacturer. Under no conditions shall beams, girders, footings or columns be cut for mechanical items. Casting of pipes into concrete is prohibited unless so shown on Drawings.
- C. Drip Pans: Provide drip pans under all above ceiling in-line pumps and cooling coils. Locate pan immediately below piping and equipment, and extend a minimum of 6" on each side and lengthwise 18" beyond equipment being protected. Fabricate pans 2" deep, of reinforced 20 gauge galvanized sheet metal with watertight seams and rolled or hemmed edges. Provide 3/4" drainage piping, properly discharged to over floor drain or as shown on the Drawings. Comply with Mechanical Code for overflow protection and pipe sizing.
- D. Access Panels: Provide access panels with proper backing reinforcement for all equipment, dielectric unions, valves and items requiring service and installed above ceilings, behind walls, or in furring, complete with correct frame for type of building construction involved. Exact size, number and location of access panels are not necessarily shown on Drawings. Use no panel smaller than 12" by 12" for simple manual access or smaller than 16" x 20" where personnel must pass through.
- E. Adjusting: Adjust and calibrate all automatic mechanical equipment, temperature controls, float devices, etc. Adjust flow rates at each piece of equipment or fixture.
- F. Building Vapor Barrier: Wherever the building insulation vapor barrier is penetrated by piping, hangers, conduits, etc., provide clear self-adhesive tape recommended by the insulation manufacturer around the penetrations.
- G. Concrete Work: Coordinate with other work, particularly other concrete work and accessories. Comply with applicable provisions of Section 03310 for mechanical work concrete, including formwork, reinforcement, mix design, materials (use mix designs and materials accepted for Division 3 work where possible), admixtures, accessories, (including waterstops), placing of wet concrete, finishing, curing, protecting, testing, submittals and other requirements of the concrete work.
- H. Housekeeping Pads: Construct minimum 3" thick with chamfered edges using 3000 psi concrete. Provide #4 reinforcing bars 8" on center in each direction and within 4" of each edge, centered in pad thickness. Provide 1/2" dowel with 3" embedment into floor slab for each 2 square feet of pad area. Dowels and equipment anchor bolts shall be spaced a minimum of 6" from pad edges.

### 3.6 VALVE INSTALLATION

- A. General: Comply with the following requirements:

1. Install valves where required for proper operation of piping and isolation of equipment, including valves in branch lines where necessary to isolate sections of piping, and where shown on the drawings. Install valves at low points in piping systems that must be drained for service or freeze protection.
  2. Locate valves in accessible spaces (or behind access panels) and so that separate support can be provided when necessary.
  3. Install valves with stems pointed up, in the vertical position where possible, but in no case with stems pointed downward from a horizontal plane.
- B. Insulated Valves: Install extended-stem valves in all piping specified as insulated, and arrange in the proper manner to receive insulation.
- C. Valve Access: Provide access panels to all valves installed behind walls, in furring or otherwise inaccessible.
- D. Lubricant-Seal: Select and install plug valves with lubricant-seal except where frequent usage is indicated or can be reasonably expected to occur.

### 3.7 INSTALLATION OF HANGERS AND SUPPORTS

- A. General: Proceed with the installation of hangers, supports and anchors only after the required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) the proper placement of inserts, anchors and other building structural attachments.
1. Install hangers, supports, clamps, and attachments to support piping and equipment properly from the building structure. Use no wire or perforated metal to support piping, and no supports from other piping or equipment. For exposed continuous pipe runs, install hangers and supports of the same type and style as installed for adjacent similar piping.
  2. Prevent electrolysis in the support of copper tubing by the use of hangers and supports which are copper plated or by other recognized industry methods.
  3. Support fire sprinkler piping independently of other piping and in accordance with NFPA Pamphlet 13.
  4. Arrange supports to prevent eccentric loading of joists and joist girders. Locate supports at panel points only.
- B. Provisions for Movement:
1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate the action of expansion joints, expansion loops, expansion bends and similar units. Install specified seismic restraints to restrict excessive movement.
  2. Install hangers and supports so that equipment and piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
  3. Install hangers and supports to provide the indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded. Comply with the following installation requirements:

- a. Clamps: Attach clamps, including spacers (if any), to piping outside the insulated piping support. Do not exceed pipe stresses allowed by ANSI B31.
- b. Insulated Pipe Supports: Insulated pipe supports shall be supplied and installed on all insulated pipe and tubing.
- c. Load Rating: All insulated pipe supports shall be load rated by the manufacturer based upon testing and analysis in conformance with ASME B31.1, MSS SP-58, MSS SP-69 and MSS SP-89.
- d. Support Type: Manufacturer's recommendations, hanger style and load shall determine support type.
- e. Insulated Piping Supports: Where insulated piping with continuous vapor barrier or where exposed to view in finished areas is specified, install hard maple wood insulation shields (Elcen Fig. 216) or steel pipe covering protection shields (MSS type 39) at each hanger.

C. Pipe Support:

- 1. Vertical Spacing: Support at base, at equivalent of every floor height (maximum 10' as required by Code) and just below roof line.
- 2. Screwed or Welded Steel or Copper Piping: Maximum hanger spacing shall be as follows:

	<u>Steel</u>	<u>Copper</u>
1-1/4" and smaller	7' span	6' span
1-1/2" pipe	9' span	6' span
2" pipe	10' span	10' span
2-1/2" & larger	12' span	10' span

- 3. Polyvinyl Chloride, Polypropylene and Other Plastic Pipe: Maximum hanger spacing and minimum rod diameters as follows:
  - a. Continuous support 1/2" to 4" pipe size Fee & Mason No. 109 channels with Fee & Mason No. 108 hanger. Lay pipe directly into the channel with fittings or couplings placed in spaces between channel sections. Secure piping to the channel at intervals between hangers with a few turns of vinyl electrical tape.
  - b. Non-Continuous Support: Maximum 4' spans or shorter if required by manufacturer for temperatures and pipe schedule.
  - c. Arrange supports to allow free movement, but restrict upward movement of lateral runs so as not to create reverse grade on drainage pipe. Use double bolt clamp or band hanger with restraint (Tolco fig. 25).
- 4. Install additional hangers or supports at concentrated loads such as pumps, valves, etc. to maintain alignment and prevent sagging.
- 5. Support Rod: Hanger support rods sized as follows:

<u>Pipe and Tube Size</u>		<u>Rod Size</u>	
<u>Inches</u>	<u>mm</u>	<u>Inches</u>	<u>mm</u>
1/2" to 4"	12.7 to 101.6	3/8"	9.5
5" to 8"	127.0 to 203.2	1/2"	12.7
10" to 12"	254.0 to 304.8	5/8"	15.9

- D. Adjust hangers and supports to bring piping to proper levels and elevations.

- E. Provide all necessary structural attachments such as anchors, beam clamps, hanger flanges and brackets in accordance with MSS SP-69. Attachments to beams wherever possible. Supports suspended from other piping, equipment, metal decking, etc., are not acceptable.
- F. Horizontal banks of piping may be supported on common steel channel member spaced not more than the shortest allowable span required on the individual pipe. Maintain piping at its relative lateral position using clamps or clips. Allow lines subject to thermal expansion to roll axially or slide. Size channel struts for piping weights.
- G. Installation of drilled-in concrete anchors shall comply with the manufacturer's instructions for working load, depth of embedment, and spacing between anchors and from the edge of the slab. Use only wedge-style anchors.
- H. Seismic Restraints: Install restraints where recommended in SMACNA "Seismic Restraint Manual" and as required by code. Show analysis of supporting structure, anchorages, and restraints in accordance with OSSC Section 1613 and reference ASCE standard. Seismic restraint system components shall be approved by the California Office of Statewide Health Planning and Development (OSHPD). Acceptable Manufacturers: Amber/Booth, Mason Industries, Tolco, or approved.

### 3.8 HVAC SYSTEM IDENTIFICATION

- A. Piping System: Indicate each pipe system by its generic name (abbreviated) as shown/scheduled/specified. Comply with ANSI A13.1 for marker locations, letter sizes, and colors. Include arrows to show direction of flow and "Electric Traced" signs to identify heat cable wrapped piping. Locate pipe labels in accessible areas as follows:
  - 1. Near each valve, meter, gauge, or control device.
  - 2. Near equipment such as pumps, heat exchangers, water heaters, etc.
  - 3. At piping branch connections.
  - 4. At penetrations (each side) of walls, ceilings, and floors.
  - 5. At access panels and doors.
  - 6. At 25 foot maximum intervals. Provide a minimum of one label above each room where lift-out ceiling is installed. Reduce intervals in congested areas such as mechanical rooms.
- B. Valve Identification: Tag all valves with brass disc and chain. Prepare valve charts indicating valve number, size, location, function and normal position. Use no duplicate numbers in Plumbing and Heating systems. Mount glazed frames containing one set of valve charts in the building mechanical room.
- C. Equipment: Provide engraved plastic-laminate signs at locations of major equipment such as heat exchangers, pumps, etc. Identify equipment in field same as on drawings. Permanently mount in an appropriate and effective location.
- D. Operation Tags: Where needed for proper and adequate information on operation and maintenance of mechanical systems, provide tags of plasticized card stock, either pre-printed or hand printed to convey the message; example: "DO NOT CLOSE THIS VALVE EXCEPT WHEN THE PUMP IS OFF."

### 3.9 EQUIPMENT CONNECTIONS

- A. Provide complete connections for all items of equipment requiring such connections, including incidental piping, fittings, trim and labor necessary for a finished working installation.
- B. Verify the rough-in and finish requirements for all equipment provided under other Divisions of the work and requiring HVAC piping or duct connections with equipment supplier and installer prior to rough-in.

### 3.10 PROTECTION

- A. Protect all work and materials against loss or damage. Close all pipe openings with caps or plugs. At final completion, thoroughly clean and deliver all work and equipment in an unblemished new condition. Keep all motors and bearings in watertight and dustproof covers during entire course of installation.
- B. Protect floors, walls, framing and sheathing where pipe cutting and threading operations are conducted with plastic sheeting under plywood sheets. Extend plastic sheeting beyond the plywood. Clean-up metal cuttings, oil, etc., daily or as necessary to prevent debris from being tracked beyond the protected area. Damages, as determined by the Architect, due to the pipe cutting/threading operation shall be repaired by the responsible trade.

### 3.11 PIPE PENETRATION FIRE STOPPING

- A. Install as recommended by manufacturer and in accordance with the product's UL listing. Below are the minimum installation requirements.
  - 1. Install specified penetrating item(s) with required annular spacing in proper size wall or floor opening. Support penetrating item(s) adequately on both sides of construction.
  - 2. Clean all opening and penetrating item surfaces in penetration area to remove loose debris, dirt, oil, wax, grease, old caulking, etc.
  - 3. If needed or required for gypsum or concrete block walls, install specified galvanized steel wire mesh or sleeve recessed and centered inside wall around penetrating item(s) so that it is snug against perimeter of opening.
  - 4. When required, install specified type and depth of backing material in annular space, recessed to required fill depth of fire stopping caulking.
  - 5. Gun, trowel, and/or pump fire stopping sealant to specified depth in annular space around penetrating item(s). Trowel sealant surfaces flush with wall or floor surfaces to a smooth, defect-free finish. Where required, apply specified size caulking bead around penetrating item(s) at zero annular contact areas and tool smooth.

### 3.12 MECHANICAL PAINTING

- A. Minimum Requirements: Comply with minimum requirements of Division 9, Painting. All mechanical equipment, piping, insulation, etc., exposed in finished areas, storage rooms and other locations except mechanical equipment rooms will be painted under Section 09 90 00.
- B. Painting Materials: Materials shall comply with Section 09 90 00, Painting and shall be compatible with the material to be painted.



- C. Uninsulated Piping: Paint black or galvanized uninsulated piping located buried in ground, in concrete or masonry one (1) coat acid-resisting black paint. Paint black or galvanized uninsulated piping in moist equipment rooms, crawl spaces without vapor barriers, or exposed to weather one (1) coat black asphaltum varnish.
- D. Iron Work: Paint hangers, rods, anchors, guides, threads of galvanized pipe, bases, supports, uncoated sheet metal and other iron work without factory finish, exposed to weather, located in moist concealed spaces and moist equipment rooms, one coat acid-resisting black paint. Apply one (1) coat Dixon's Aluminum Graphite No. 209 paint over the (1) coat primer as recommended by paint manufacturer to all hot metal surfaces.
- E. Piping in Mechanical Room: All insulated and uninsulated piping exposed in mechanical equipment rooms shall be painted. Painting is not required for cast iron, plastic, or glass waste piping, or for stainless steel piping, PEX tubing and soft copper tubing. Contractor shall submit proposed colors for approval. In lieu of painting, insulated piping may be covered with colored PVC insulation jacketing as specified in Section 23 07 00, HVAC Insulation.
- F. Insulated Piping and Other Insulated Surfaces: Paint insulated piping in half-round, split tile, or other inaccessible locations, one (1) coat asphalt emulsion.

### 3.13 TEMPORARY HEATING AND COOLING

- A. Comply with requirements of Section 01500.
- B. Permanent mechanical systems' equipment utilized for temporary heating, ventilating and cooling shall be started with all controls and safeties installed and operational. Start-up shall be done by a factory approved mechanic only.
- C. Owner's warranties shall not be abridged by contractor's use of the permanent systems' equipment prior to final acceptance. Warranty period shall begin at final completion.

### 3.14 HVAC WORK CLOSEOUT

- A. General: Refer to the Division 1 sections for general closeout requirements. Calibrate all equipment requiring same. Complete each system as shown or specified herein and place in operation except where only roughing-in or partial systems are called for. Each system shall be tested and left in proper operation free of leaks, obstructions, or contamination.
- B. Record Drawings: Submit record set of drawings required in Section 01300, Submittals, or as previously specified in this Section.

- C. Closeout Equipment/Systems Operations: Sequence operations properly so that work of project will not be damaged or endangered. Coordinate with seasonal requirements. Operate each item of equipment and each system in a test run of appropriate duration with the Architect present, and with the Owner's operating personnel present, to demonstrate sustained, satisfactory performance. Adjust and correct operations as required for proper performance. Clean and lubricate each system and replace dirty filters, excessively worn parts and similar expendable items of the work.
  
- D. Operating Instructions: Conduct a walk-through instruction seminar for the Owner's personnel who are to be involved in the continued operation and maintenance of the HVAC equipment and systems. Provide written instructions outlining and explaining the identification system, operational diagrams, emergency and alarm provisions, sequencing requirements, seasonal provisions, security, safety, efficiency and similar features of the systems.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. The requirements of this section apply to the insulation of mechanical equipment specified elsewhere in these specifications.
- B. Related Work: The requirements of Section 23 05 00, Common HVAC Materials and Methods, also apply to this section.

### 1.2 QUALITY ASSURANCE

- A. Insulation Thickness and Thermal Performance: Comply with the provisions of the State of Oregon Energy Efficiency Specialty Code (OSEEC).
- B. Composite (Insulation, Jacket or Facing and Adhesives) Fire and Smoke Hazard Ratings: Not to exceed a flame spread of 25 or smoke development of 50 and containing less than 0.1% by weight deca-PDE fire retardant.
- C. Component Ratings of Accessories (Adhesives, Mastics, Cements, Tapes, Finishing Cloth for Fittings): Same as "B" requirements above and permanently treated. No water soluble treatments.

### 1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: In addition to the requirements specified in Section 15050, the following apply:
  - 1. Deliver insulation, coverings, cements, adhesives and coatings to the site in factory-fabricated containers with the manufacturer's stamp or label affixed showing fire hazard ratings of the products. Store insulation in original wrappings and protect from weather and construction traffic.
  - 2. Protect insulation against dirt, water, chemical and mechanical damage. Do not install damaged insulation. Remove such insulation from project site.

### 1.4 SUBMITTALS

- A. Submit catalog data and performance characteristics for each product specified.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Insulating Manufacturers: Johns Manville, Knauf, Armstrong, Owens-Corning, Pittsburgh Corning, Pabco, Imcoa, Nomaco, or Certain Teed. Johns Manville products are listed unless indicated otherwise.
- B. Adhesive Manufacturers: Foster, 3M, Insul-Coustic, Borden, Kingco or Armstrong.

## 2.2 PIPING INSULATION

- A. Interior and Exterior Piping Systems 50 to 850 Deg. F: Glass fiber preformed pipe insulation with a minimum K-value of 0.23 at 75 Deg. F, a minimum density of 3.5 pounds per cubic foot within all-service vapor barrier jacket containing less than 0.1% by weight deca-PDE fire retardant, vinyl or pre-sized finish and pressure sensitive seal.
- B. Exterior Installations: Same as for interior installations except 0.016" aluminum finish jacket or, in coastal environments, 0.01" stainless steel.
- C. Interior Piping Systems 32 to 50 Deg. F: Glass fiber preformed pipe insulation with a minimum K-value of 0.23 at 75 deg. F, a minimum density of 3.5 pounds per cubic foot. Polymer vapor barrier jacket containing less than 0.1% by weight deca-PDE fire retardant and with pressure sensitive seal and wicking system to remove condensation from pipe surface. Owens Corning "VaporWick."
- D. Pipe Temperatures Minus 30 to 180 Deg. F: Flexible, preformed, pre-slit, self-sealing elastomeric pipe insulation up to 2-1/8" ID, thermal conductivity of 0.27 BTU/hr. sq. ft./in. at 75 deg. F and vapor transmission rating of 0.2 perms/inch. Apply in thickness necessary to prevent condensation on the surface at 85 deg. F and 70% RH. Armstrong "Armaflex 2000" or, in concealed locations, Imcoa or Nomaco also approved.
- E. Pipe Temperatures up to 1200 Deg. F: High temperature molded calcium silicate insulation with aluminum metal jacket. Furnish with aluminum snap straps. Apply in thickness required for a maximum surface temperature of 120 deg. F at 80 deg. F ambient and for the flow media temperatures. Johns Manville Thermo-12/Gold.

## 2.3 DUCT INSULATION

- A. Interior Above Grade Ductwork: Glass fiber formaldehyde-free blanket with "FSK" facing containing less than 0.1% by weight deca-PDE fire retardant, k value = 0.31 at 75 deg. F, 0.2 perms, and UL 25/50 surface burning rating. Johns Manville "Microlite."
- B. Below Grade Ductwork: Insulate with foamed-in-place urethane insulation.
- C. Exterior Above Grade Ductwork: Glass fiber board with "FSK" facing containing less than 0.1% by weight deca-PDE fire retardant, 3 pound density, k value of 0.23 at 75 deg. F and 0.2 perms. Install with 0.016" aluminum jacket. Johns Manville 800 Series Spin-Glas.

## 2.4 EQUIPMENT INSULATION

- A. Equipment Temperatures Below 70 Deg. F: Flexible, closed cell, elastomeric sheet insulation of 5.5 #/cubic feet density and 0.27 thermal conductivity at 75 deg. F. Armstrong "Armaflex."

- B. Equipment Temperatures From 70 to 450 Deg. F: Glass fiber 3 pound density insulation with a 0.23 thermal conductivity at 75 deg. F. Johns Manville "814 Spin-Glas" with "FSK" jacket containing less than 0.1% by weight deca-PDE fire retardant or finished as recommended by manufacturer.
- C. Equipment Temperatures From 350 to 1200 Deg. F: Molded high temperature calcium silicate minimum 12.5 pound density and 0.4 thermal conductivity at 200 deg. F mean temperature. Glass cloth finish, Claremont Diplag or finished as recommended by insulation manufacturer.
- D. Exterior Tanks and Equipment Insulation Covering: Same as interior insulation with weatherproof metal or finished as recommended by insulation manufacturer.

## 2.5 INSULATION ACCESSORIES

- A. Insulation Compounds and Materials: Provide rivets, staples, bands, adhesives, cements, coatings, sealers, welded studs, etc., as recommended by the manufacturers for the insulation and conditions specified except staples not permitted on chilled water lines.
- B. Interior Tanks and Equipment Insulation Covering: Finished metal jacket or as recommended by the manufacturer for insulation material specified.
- C. PVC Protective Jacketing and Valve and Pipe Fitting Covers: Johns Manville Zeston 2000, Proto LoSmoke, or Ceel-Co Ceel-Tite 100 Series with precut fitting fiberglass insulation or approved.
- D. Jacket Lap Sealing Adhesives: Foster Drion 85-75 contact cement or approved substitute.
- E. Removable/Reusable Insulation Covers:
  - 1. 200 to 600 Deg. F Insulation Filler: Install 2-1/4# - 4#/cu. ft. glass fiber, 6# - 8#/ cu. ft. mineral wool or glass fiber/type E felted (9#/cu. ft.) flexible blankets and pads for large, irregular shaped equipment such as pump casings, bolting flanges, etc. For small common shapes such as valves, elbows, flanges, etc., install preformed flexible glass fiber pipe wrap, preformed glass fiber pipe covering or glass fiber/type E felted (9#/cu. ft.) insulation.
  - 2. 600 - 1000 Deg. F Insulation Filler: Install 4# - 8#/cu. ft. refractory fiber felted, 8# - 10#/ cu. ft. mineral wool or glass fiber/type E felted (9#/cu. ft.) flexible blankets and pads. Install mineral wool pipe wrap, glass fiber/type E felted (9#/cu. ft.), laminated refractory fiber (4# - 6#/cu. ft.) with flexible glass fiber wrap or refractory (ceramic) fiber (6#/cu. ft.) preformed insulation.
  - 3. Over 1000 Deg. F Insulation Filler: Install refractory (ceramic) fiber (6# - 8#/cu. ft.) blanket or pad insulation or 6#/cu. ft. preformed insulation.
  - 4. Encasement, 200 to 600 Deg. F: Glass fiber cloth plain or silicon coated on both sides, knitted stainless steel mesh, glass fiber cloth laminate with aluminum, or stainless steel foil or hex wire mesh.
  - 5. Encasement, 600 to 1000 Deg. F: Glass fiber cloth with stainless or monel wire insertion, knitted stainless steel mesh, ceramic cloth, or glass fiber cloth laminated with stainless steel foil.

6. Encasement, Over 1000 Deg. F: Refractory cloth with nickel or inconel wire insertion, knitted inconel mesh or ceramic cloth with nickel wire insertion.
7. Cold Encasement: Glass fiber cloth silicon coated both sides, knitted stainless steel mesh, glass fiber cloth laminate with aluminum or stainless steel foil or glass fiber cloth with nickel wire insertion, silicon coated both sides.
8. Stitching, 200 to 600 Deg. F: Glass fiber thread/PVC coated, staples - galvanized or stainless steel, galvanized or stainless steel hog rings, 0.010" - 0.15" dia/dead soft stainless steel wire.
9. Stitching, 600 Deg. F: Same as 200 to 600 Deg. F above except no galvanized staples or rings and PVC coated thread to 850 deg. F.
10. Attachments and Securements:
  - a. Quilting: Stainless 2-hole washers, both sides with twisted 0.035" - 0.051" wire loops, 12 ga. stainless spindle/washer/ speed clip assembly or stainless 0.035" - 0.051" wire loops.
  - b. Lacing and Hooks: Stainless 2-hole 12 gage bent wire lacing hooks, stainless 2-hole dished washer assembly with twisted 0.035" - 0.051" wire loops, 12 gage stainless spindle washer with built-in hook and speed clip or stainless 1-hole dished and flat washer riveted through the cloth.

### PART 3 - EXECUTION

#### 3.1 PIPING INSULATION

- A. General: Do not insulate underground piping except at joints and fittings on preinsulated piping unless indicated otherwise.
- B. Domestic Water Piping:
  1. Insulate with glass fiber pipe covering, 1" thick for cold water piping and for 1" and smaller hot water piping; 1-1/2" for 1-1/4" and larger hot water piping.
  2. At contractor's option and in accordance with Part 2 of this section, elastomeric insulation may be installed on domestic water piping in thicknesses equivalent to the glass fiber insulation. Installation shall comply with the manufacturer's recommendation with joints and seams completely sealed. Insulate hot water return piping same as cold water piping.
- C. Interior Rain Drains:
  1. Concealed: Insulate with 1" thick one pound density glass fiber blanket and continuous vapor barrier jacket.
  2. Exposed: Insulate with 3.5 pound density glass fiber insulation with continuous vapor barrier jacket.
  3. Eastern Oregon: Insulate over heat tape where indicated.
- D. Waste Lines: Insulate all pipe exposed to outside temperatures with 3/4" thick glass fiber pipe insulation with a vapor barrier jacket.

- E. Refrigerant Piping Insulation: Insulate suction piping with minimum 1/2" thick foamed plastic or of thickness necessary to prevent condensation at 85 deg. F and 70% RH. Where possible, slip insulation over the piping as it is installed. Seal all joint and seams.
- F. Pipe Fittings:
  - 1. Insulate and finish all fittings including valve bodies, bonnets, unions, flanges and expansion joints with precut fiberglass insulation and preformed PVC covers sealed to adjacent insulation jacket for continuous vapor barrier covering over all fittings.
  - 2. Provide removable/reusable insulation covers on 4" and larger valves, unions, flanges, pump casings, strainers and similar fittings or equipment requiring periodic service.
- G. Protective Covering: Install continuous protective PVC or metal covering on all piping and fittings in mechanical rooms, accessible tunnels, attic spaces, accessible ceilings, etc., where insulation may be subject to damage. Install with rivets or cement seams and joints.
- H. Piping Insulation Lap Seams and Butt Joints: Install insulation jacket in accordance with manufacturer's recommendation. Where jacket joint and lap seams have not adhered, remove affected section of insulation and reinstall or apply lap sealing adhesive in accordance with manufacturer's instructions.

### 3.2 DUCTWORK INSULATION

- A. Ductwork: Insulate the following:
  - 1. All supply ductwork with cooling.
  - 2. All supply and return ductwork in systems routed in unconditioned spaces or exposed to the outside conditions.
  - 3. All outside air intake ducts.
  - 4. All ductwork required to be insulated by code.
- B. Insulation Thickness: Select board and blanket insulation of thickness required to provide the R-value as required by code.
- C. Fittings: Wire and duct adhesive as required. To prevent sagging on all rectangular or square ducts over 24" wide, install Gramweld or equal welding pins on the bottom. Maximum spacing 18" on center in both directions.
- D. Installation: Applied with butt joints, all seams sealed with vapor seal mastic or taped with 2" wide vapor-proof, pressure-sensitive tape. Seal all penetrations with vapor barrier adhesive.
- E. Internally Lined Ductwork: Where internally lined ductwork is indicated on the Drawings and/or specified, no exterior insulation is required. Select duct lining to provide the required R-value. Carefully lap the ends of the exterior insulation a minimum of 6" past the interior insulation unless otherwise shown. Seal the end of vapor barrier jacket to the duct with mastic where the vapor barrier is required. Duct lining is specified in Section 23 30 00.

### 3.3 EQUIPMENT ROOM ITEMS

- A. Items To Be Insulated: All equipment room items except the following:
1. Condensate receivers.
  2. Cushion (expansion) tanks.
  3. Breechings.
- B. Materials:
1. 1-1/2" calcium silicate blocks applied with wire or bands as required. Finish with 1/2" thick smoothing coat of insulating cement and with glass cloth.
  2. For equipment and piping systems operating below 350 deg. F., a 3 pound per cubic foot, 1-1/2" thick spun glass fiber blanket with organic binders and aluminum sheet metal exterior jacket may be substituted for the above insulation.
  3. Install tank head finish per manufacturer's recommendations.
- C. Manholes, Nameplates, Handholes, Cleanouts, Etc.: Do not insulate over manholes, ASME Code stamps, manufacturer's nameplates, handholes, cleanouts, etc. Provide neatly beveled edges at interruptions of the insulation. When surfaces are to operate below ambient saturation temperatures, provide removable sections of insulation to cover the above with vapor sealed edges. Provide appropriate tagging.

END OF SECTION



## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide Air Distribution Materials as specified herein and as shown on the Drawings.
- B. Material characteristics and size shall be as indicated on the Drawings.
- C. Related Work: The requirements of Section 23 05 00, Common HVAC Materials and Methods, also apply to this section.

### 1.2 QUALITY ASSURANCE

- A. Air Distribution Equipment Rating: In accordance with AMCA certified rating procedures and bearing the AMCA label.

### 1.3 SUBMITTALS

- A. Submit catalog data, construction details and performance characteristics for all manufactured materials.
- B. Submit operating and maintenance data.

## PART 2 - PRODUCTS

### 2.1 SHEET METAL

- A. Sheet Metal Materials:
  - 1. General Material Requirements: Comply with the Mechanical Code and SMACNA'S "HVAC Duct Construction. Standards – Metal and Flexible, Third Edition" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
  - 2. All interior ducts shall be constructed with G-60 or better galvanized steel conforming to ASTM A653/A653M and A924/A924M Standards, LFQ, chem treat. Exterior ductwork or duct exposed to high humidity conditions (that is: kitchen exhausts, etc.) shall be G-90 or better galvanized steel, conforming to ASTM A653/A653M and A924/A924M Standards, LFQ, chem. treat.
  - 3. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.
  - 4. Tie Rods: Galvanized steel, ¼ inch (6 mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8 inch (10 mm) minimum diameter for lengths longer than 36 inches (900 mm).
- B. Duct Fabrication requirements: Metal gauges, joints and reinforcement in accordance with Mechanical Code, ASHRAE and SMACNA standards. Ductwork shall be fabricated to the following pressure classifications:

1. Return and exhaust ducts: 1" negative.
2. Supply ducts from fan discharge to diffuser: 1" positive.

### PART 3 - EXECUTION

#### 3.1 EQUIPMENT INSTALLATION

- A. Air Handling Equipment Installation and Arrangement: Install and arrange as shown on Drawings. Comply with the manufacturer's recommendations for installation, connection, and start-up.
- B. Equipment Access Panels: Locate free of all obstructions such as ceiling bars, electrical conduit, lights, ductwork, etc.
- C. Filters: Install specified filters or accepted substitute temporary construction filters in supply units and systems prior to start-up or use for drying and/or temporary heat. Replace prior to acceptance of project.

#### 3.2 INSTALLATION OF GRILLES, REGISTERS AND DIFFUSERS

- A. Size and air handling characteristics shall be as shown on the Drawings.
- B. Locate, arrange, and install grilles, registers and diffusers as shown on the Drawings. Locate registers in tee-bar ceilings with diffusers centered on the tile unless indicated otherwise.

#### 3.3 DUCTWORK INSTALLATION

- A. Delivery, Storage and Handling:
  1. Protect shop fabricated and factory fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings with a polyethylene film with a high-tack pressure sensitive adhesive to attach to the ductwork and accessories.
  2. Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with a polyethylene film with a high-tack pressure sensitive waterproof wrapping.
- B. Support: Install ductwork with 1" wide strap cradle hangers not more than 8' on centers or as required by code. Support terminal units independent of adjacent ductwork. Attach to available building construction according to good practices for materials involved. Manufactured hanger system acceptable in lieu of fabricated hangers at contractors option. Ductmate "Clutcher" system or approved.
- C. Fan and Air Handling Unit Flexible Connections: Install flexible connections in ductwork at all rotating equipment.
- D. Elbows and Fittings: Construct elbows with throat radius equal to duct width in plane of turn or make them square and provide double wall, air foil turning vanes.

- E. Fittings: Make transitions and take-offs as shown on Drawings. Provide volume dampers and splitter dampers as indicated on Drawings and as specified. Saddle tees are not allowed.
- F. Acoustical Duct Lining: Acoustically line all fan unit intake and discharge plenums, all ductwork indicated as lined on the Drawings, all sheet metal ductwork specified per Section 23 07 00 as insulated, where exposed to view or subject to damage in areas such as mechanical rooms, and, at the Contractor's option, all insulated ductwork specified in Section 23 07 00. Line ducts with 1" thick lining for installation inside the building insulation envelope, and 2" for installation outside the building insulation envelope. Mechanically attach lining to sheet metal duct with Grip Nails or welding pins. Apply fire-retardant type water based adhesive on all leading edges, joints and seams. The duct size noted on the Drawings is the clear opening of the duct with lining. Insulation shall not reduce duct size listed. No high pressure/velocity duct systems, grease and moisture conveying duct systems or computer and health care supply duct systems shall be internally lined.
- G. Manual Volume Dampers: Location of all volume dampers are not necessarily shown on the Drawings. Provide a minimum of one volume damper in each supply, return or exhaust branch. Install dampers in fiberglass ductwork (where fiberglass ductwork is allowed) with galvanized sheet metal sleeves of sheet metal gauges required for metal duct systems of the same dimensions.
- H. Duct Insulation: Specified in Section 23 07 00.
- I. Sleeves: Provide galvanized sheet metal plaster ring around ductwork penetrating exposed finished walls. Sleeve and flash all duct penetrations through exterior walls in an air tight and weatherproof manner.
- J. Plenums: Construct sheet metal plenums and partitions of not lighter than 18 gauge galvanized steel and reinforce with 1-1/2" by 1/2" by 1/8" angles as required to prevent drumming or breathing.
- K. Access: Install necessary access opening and covers for cleaning, wiring or servicing motors, filters, fans, both entering and leaving air sides of coils, fire and/or smoke dampers and to other equipment located within or blocked by sheet metal work.
- L. Sealing: Caulk, seal, grout and/or tape ductwork and plenums to make airtight at seams, joints, edges, corners and at penetrations. Solder all seams, joints, etc., on all ductwork exposed to the weather. Install specified tape in accordance with manufacturer's requirements using degreaser on surfaces to be taped and wiped to eliminate moisture.
- M. Flexible Duct Connections:
  - 1. Install in full extended condition, free of sags and kinks, using only the minimum length required to make the connection.
  - 2. Make all joints and connections with 1/2" wide positive locking steel straps or nylon self-locking straps and make connections to non-metallic ducts with sheet metal sleeves or manufactured sheet metal "spin-in" fittings.

3. On vertically suspended ducts, secure with a minimum of three sheet metal screws on a maximum of 8" on center.

#### 3.4 FIELD QUALITY CONTROL

- A. Disassemble, reassemble, and seal segments of systems as required to accommodate leakage testing and as required for compliance with test requirements.
- B. Conduct test, in presence of Architect, at static pressures equal to maximum design pressure of system or section being tested. If pressure classifications are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
- C. Determine leakage from entire system or section of system by relating leakage to surface area of test section.
- D. Maximum Allowable Leakage: Comply with requirements for Leakage Classification 3 for round and flat-oval ducts, Leakage Classification 12 for rectangular ducts in pressure classifications less than and equal to 2-inch wg (both positive and negative pressures).
- E. Remake leaking joints and retest until leakage is less than maximum allowable.
- F. Leakage Test: Perform tests according to SMACNA's "HVAC Air Duct Leakage Test Manual."

#### 3.5 NEW DUCTWORK CLEANING

- A. Store all ductwork materials on pallets or above grade, protected from weather, dirt/mud and other construction dust.
- B. Remove all accumulated dust, dirt, etc. from each duct section as it is being installed.
- C. Prior to installation of diffusers, grilles and registers, install temporary system filters and cover all diffuser, grille and register openings with temporary 25% efficiency filter materials and start the fan systems. Operate fans a minimum of 8 hours. Remove all temporary filters at the end of that period.
- D. Clean all diffusers, grilles and registers just prior to project final completion.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The provisions of the General Requirements, Supplementary Requirements, and Division 1 apply to the electrical work specified in this Section.
- B. The requirements of this Section apply to the electrical systems specified in these Specifications and in other Division 26 sections.
- C. Provide all items, articles, materials, equipment, operations and/or methods listed, mentioned, shown and/or scheduled on the Drawings and/or in these Specifications, including all labor, supervision, services, permits, fees, and incidentals necessary and required to provide a complete and operable facility with complete systems as shown, specified, and required by applicable codes.
- D. The work shall include, but not be limited to, the following systems:
  - 1. Electrical service complete per serving utility company requirements.
  - 2. Electric service and distribution equipment.
  - 3. Complete lighting and power systems, including panelboards, branch circuits, devices, lighting fixtures, etc.
  - 4. Telephone service conduit, terminal boards, terminal cabinets, outlets, raceway system, and grounding per utility requirements.
  - 5. Fire alarm central control panel, initiating and annunciating devices, raceway and cabling system, etc.
  - 6. Connection of electrical equipment furnished under other Divisions of this Specification.
  - 7. Wiring to and connection of electrical equipment or appliances furnished outside of these Specifications and Contract but described on the Electrical Drawings.
  - 8. Special systems as specified herein.
  - 9. Grounding.
- E. Advise subcontractor, suppliers, and vendors involved in the work specified in this Section of the applicable requirements.
- F. Temporary electrical service, Division 1.

1.2 QUALITY ASSURANCE

- A. All work and materials shall conform to all applicable local and state codes and all federal, state and other applicable laws and regulations. All clarifications and modifications which have been cleared with appropriate authorities are listed under the applicable sections. All electrical products shall bear the UL label.
- B. Whenever the requirements of the Specifications or Drawings exceed those of the applicable code or standard, the requirements of the Specifications and Drawings shall govern.
- C. Codes and Standards: Comply with the provisions of the following referenced codes, standards and specifications:

1. Institute of Electrical and Electronic Engineers (IEEE)
  2. Federal Specifications (FS)
  3. American National Standards Institute (ANSI)
  4. National Electrical Manufacturer's Association (NEMA)
  5. National Fire Protection Association (NFPA)
  6. Underwriters Laboratories, Inc. (UL)
  7. Factory Mutual (FM)
  8. International Building Code (IBC) with State and Local Amendments
  9. National Electrical Code (NEC) with State and Local Amendments
  10. American Society for Testing and Materials (ASTM)
  11. Americans with Disabilities Act (ADA)
  12. International Fire Code (IFC) with State and Local Amendments
  13. National Electrical Contractors Association (NECA)
- D. Each piece of equipment furnished shall meet all detailed requirements of the Drawings and Specifications and shall be suitable for the installation shown. Equipment not meeting all requirements will not be acceptable, even though specified by name. Where two or more units of the same class of equipment are furnished, use product of the same manufacturer; component parts of the entire system need not be products of same manufacturer. Furnish all materials and equipment, new and free from defect and of size, make, type and quality herein specified or approved by the Architect. All materials shall be installed in a neat and professional manner.
- E. All apparatus shall be built and installed to deliver its full rated capacity at the efficiency for which it was designed.
- F. All disconnect switches, panelboards, switchboards, motor control centers, and equipment of like nature shall be of the same manufacturer.
- G. The Drawings and Specifications are complementary. What is called for by one shall be as though called for by both. If Drawings and Specifications contradict each other, the Contractor shall obtain written clarification prior to the bid. If time constraints are such that this is not possible, then the more stringent of the conflicting requirements shall be included in the bid. The Specifications are not automatically more authoritative than the drawings.

### 1.3 WORK OF OTHER CONTRACTS

- A. Work under this contract shall be conducted in a manner to allow for the future installations of such equipment or items, and include the wiring and/or devices shown on the Drawings or listed in other sections of this Specification. Also see "Equipment Connections."

### 1.4 WORK OF OTHER DIVISIONS

- A. Work under this Division shall be conducted in a manner to cooperate with the installation of work of other Divisions.
- B. Control devices (i.e. magnetic starters) and control wiring relating to the heating, ventilating and air conditioning systems and plumbing systems are specified under other Sections of these Specifications except for provisions or items specifically noted on the Drawings or specified herein.

- C. Consult all Drawings and Specifications in this project and become familiar with all equipment to be installed. Coordinate all aspects of the construction with the other trades on the job to ensure that all work and materials required to provide a complete and operational facility are included in the bid.
- D. All sections of Division 26 are interrelated and shall be considered in their entirety when interpreting any material, method, or direction listed in any section of Division 26. Individual sections are not written for specific subcontractors or suppliers but for the general contractor.

#### 1.5 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- A. Submit in accordance with Division 1 full technical and descriptive shop drawing data on proposed materials and equipment as detailed in each section.
- B. The Contractor shall verify that all equipment submitted can be delivered and installed within the time constraints of the construction period.
- C. Include the manufacturer, type, style, catalog number, complete specification, certified dimensions, and description of physical appearance for each item and option submitted. Reproduction of catalog data sheets shall be clean and legible to show all details, including gauge of metal used.
- D. Include only information on exact equipment to be installed, not general catalogs of the manufacturer. Where sheets show proposed equipment as well as other equipment, identify proposed equipment with rubber stamp arrow or similar concise method.
- E. Submit with each copy a transmittal letter verifying that all included equipment submittals have been carefully considered for quality, dimensions, function, and have been coordinated with the Drawings and Specifications. Guarantee that proposed materials will meet or exceed the quality and function of those specified.
- F. Include wire run and connection diagrams for all signal and/or low voltage systems, including floor plans.
- G. Submittal Review: The submittal review process is a means to determine quality control. The action noted to be taken (or where conflicts with the contract documents are not noted) shall not be interpreted by the Contractor as automatic "change orders." Approval of the data for substitution and shop drawings shall not eliminate the contractor's responsibility for compliance with Drawings or Specifications, nor shall it eliminate the responsibility for freedom from errors of any sort in the data discovered prior to or after the review process. Deviations, discrepancies, and conflicts between the submittals and the Contract Documents shall be called to the Architect's attention in writing at the time of transmittal of the data.
- H. Unless otherwise directed by Division 1, submittal data shall be in a 3-ring plastic binder with a clear plastic sleeve cover and a project identification sheet inserted. Arrange submittals numerically with specification sections identified on divider tabs. All required sections shall be submitted at one time.

#### 1.6 PRODUCT SUBSTITUTION

- A. Material other than those specified may be approved for this project providing a written request is submitted to the Architect prior to bid in accordance with Instructions to Bidders. Requests shall include complete specifications, dimensions, manufacturer and catalog number for each item for which approval is desired. If, in the opinion of the Architect, the material is not complete or if it is not an acceptable substitute, he may reject it. The Architect's evaluation will be based solely on the material submitted.
- B. The Architect reserves the right to require the submission of an actual sample of the specific item before the review and acceptance of any product as an equal to that specified.

#### 1.7 CHANGE ORDERS

- A. All supplemental cost proposals by the Contractor shall be accompanied by a complete itemized breakdown of labor and materials without exception. At the Architect's request, the contractor's estimating sheets for the supplemental cost proposals shall be made available to the Architect. Labor must be separated and allocated for each item of work.

#### 1.8 RECORD DOCUMENTS

- A. Maintain a set of record drawings as directed in Division 1.
- B. Keep Drawings clean, undamaged, and up to date.
- C. Record and accurately indicate the following:
  - 1. Depths, sizes, and locations of all buried and concealed conduits/cables.
  - 2. Changes, additions, and revisions due to change orders, addenda, obstructions, etc. Eradicate extraneous information.
- D. Make Drawings available when requested by Architect for review.
- E. Submit as part of the required Project Closeout documents as indicated in Division 1.
- F. Use standards set in contract documents. Computer-aided design drafting (CADD) shall be used to complete project record drawings. Note field modifications, all addenda and change order items on project record drawings. If deficiencies are found in either the quality or the accuracy of the drawings, they will be returned unapproved. Additional review of subsequent submissions shall be at the contractor's expense.

#### 1.9 OPERATING AND MAINTENANCE DATA



- A. Upon completion of Contract and after no further action is noted as being required on catalog data submitted for review, submit multiple sets of Operating and Maintenance Manuals for inclusion in Owner's Maintenance Brochure as specified in Division 1. Operation and maintenance manuals shall include descriptive and technical data, maintenance and operation procedures, wiring diagrams, spare parts lists, service representatives, supplier for replacement parts, etc. Bind each set of Operating and Maintenance Manuals in 3-ring, vinyl or canvas covered, loose leaf binders organized with index and thumb-tab marker for each classification of equipment or data.

#### 1.10 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. At the completion of the project, at a time scheduled by the Owner, assemble key mechanics, subcontractors, vendors, factory representatives and similar personnel required to explain all facets of maintenance and operation of the installed system to the Owner's personnel. Instructions shall include actual operation of systems and methods of maintenance.
- B. Systems Manual: Submit separate Systems Manual [30] days prior to scheduling the required Instruction Period. The Systems Manual shall be a hard copy binder with fold out full size drawings, and a CD with all data in electronic format. The Document shall contain at minimum the following:
  - 1. Permit/Construction/Design Drawings.
  - 2. Contractor As-Built Drawings.
  - 3. A final version of the Basis of Design Document for LEED or Design Build projects.
  - 4. Single line diagrams for all systems or components that require regular owner adjustment.
  - 5. As-Built Sequence of Operations, Control Drawings, and Original Set Points for all equipment requiring contractor programming or set up, including but not limited to;
    - a. Lighting Control Systems.
    - b. HVAC DDC systems.
    - c. HVAC Equipment.
    - d. Plumbing/Pump systems.
    - e. Emergency Power systems.
    - f. All systems specifically required to be Commissioned.
    - g. Minimum set point data to include
      - 1) Seasonal System Adjustments
      - 2) Normal settings for thermostats, fans, VFDs and other motor switching devices.
      - 3) Normal Valve Settings.
      - 4) Original settings for time clocks, schedules, and Lighting Control Panels.
  - 6. Operating instructions for integrated building systems.
  - 7. Programing instructions.
  - 8. Recommended schedule of maintenance requirements and frequency.
  - 9. Recommended schedule for retesting of commissioned systems with blank test forms from the original commissioning plan.
  - 10. Recommended schedule for calibrating sensors and actuators.
  - 11. Emergency measures and procedures for systems failures.

#### 1.11 ALTERNATE BIDS

- A. Refer to Division 1 for possible effect of bid alternates upon Work of this Division.

#### 1.12 WARRANTY

- A. Furnish, prior to application for final payment, three copies of written and signed guarantee effective a period of one year from date of completion and acceptance of entire project; agree to correct, repair and/or replace defective materials and/or equipment or the results of defective workmanship without additional expense to the Owner. Where no response satisfactory to the Owner has occurred within three working days from the written report of a warranty covered defect, the contractor shall agree to pay for the cost of repair of the reported defect by a contractor of the Owner's choice.
- B. Where the manufacturer's guarantee exceeds one year, the longer guarantee shall govern and include the Contractor's labor.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. All electrical products installed in this project shall be listed by Underwriters Laboratories, Inc., or be approved in writing by the local inspection authority as required by governing codes and ordinances.
- B. All material shall be new and bear manufacturer's name, model number, electrical characteristics and other identification, and shall be the standard product of manufacturer regularly engaged in production of similar material.
- C. All materials shall be of manufacturer's latest design, and of the best quality. The materials shall be manufactured in accordance with applicable standards listed under Quality Assurance.

#### 2.2 ACCESS PANELS

- A. Provide panels of adequate size for equipment requiring service and installed above plaster or gypsum board ceilings, behind walls or in furring. Furnish complete with correct frame for type of building construction involved. Size, number and location of access panels is not necessarily shown on Drawings. Use no panel smaller than 12" x 12" for simple manual access, nor smaller than 16" x 20" where personnel must pass through. Milcor Style A, K, L, or M panels or equivalent Bilco or Potter-Roemer as required by construction. Access panels shall maintain ceiling fire rating.

#### 2.3 PAINTING

- A. The work of this Division includes painting of the electrical items. All exposed conduits, boxes, surface raceways, etc. shall be painted per the Architect's direction. See Division 9 for additional painting requirements.

#### 2.4 FIRE RATINGS

- A. Electrical items (light fixtures, boxes, etc.) recessed into fire rated walls or ceilings shall be alcoved in gypsum enclosures or be UL listed to maintain the fire rating.

### PART 3 - EXECUTION

#### 3.1 LAYOUT AND COORDINATION

- A. The Contractor shall inspect the job site prior to bidding and become familiar with existing conditions which will affect his work. The Drawings are diagrammatic indicating approximate location of outlets, lighting fixtures, electrical equipment, etc. Consult the Architectural, Structural and Mechanical Drawings to avoid conflicts with equipment, structural members, etc. When required, make all deviations from Drawings to make the work conform to the building as constructed, and to related work of others. Minor relocations ordered prior to installation may be made without added cost to the Owner.
- B. Obvious omissions from Drawings or Specifications or differences between Drawings and Specifications shall be called to the Architect's attention at least ten (10) days prior to the bid date for clarification. Failure to do so will be construed as the willingness of this Contractor to supply all necessary materials and labor required for the proper completion of this work in a manner approved by the Architect.
- C. Call to the attention of the Architect any error, conflict or discrepancy in Drawings and/or Specifications. Do not proceed with any questionable items of work until clarification of same has been made.
- D. Supplementary details and plans may be supplied as required and they will become a part of the Contract Documents.
- E. Work under this Division shall be conducted in a manner to cooperate with all other trades for proper installation of all items of equipment.
- F. Coordination of work with other crafts employed on the project is mandatory. Arrange work to reduce interruption of existing services to minimum. When interruptions are unavoidable, consult Architect and utilities involved and agree in writing, with copy to the Architect, upon a mutually satisfactory time and duration.
- G. Verify the physical dimensions of each item of electrical equipment to fit the available space and promptly notify the Architect prior to roughing-in if conflicts appear. Coordination of equipment to fit the available space and the access routes through the construction shall be the Contractor's liability.
- H. Locations of items shown on the Drawings as existing are partially based on record and other drawings which may contain errors. The Contractor shall verify the correctness of the information shown prior to rough-in or demolition and notify the Architect of any discrepancies.
- I. Coordinate all work and trim with carpet installers. Provide carpet plates on all carpet surfaces, complete as required.

- J. Install equipment such that code-required working clearances are maintained, and allow clearances for future maintenance.
- K. Coordinate installation of electrical conduit, boxes, fittings, anchors, and miscellaneous items to be concealed in precast concrete assemblies.

### 3.2 UTILITY COORDINATION

- A. Utility Coordination: Coordinate all aspects of the incoming electrical, telephone and other utility services indicated with the city engineer, serving utility, and the off-street improvements contractor. Requirements of the utility company which exceed the provisions made on the Drawings or covered by these Specifications shall take precedence. Provisions made on the Drawings or Specifications in excess of the utility company's requirements shall take precedence. No additional compensation will be allowed the contractor for connection fees or additional work or equipment not covered in the Drawings or Specifications which are a result of policies of the serving utilities.
- B. The Contractor shall contact the serving utility representatives and verify if any charges will be rendered against this project. These charges, if any, shall be included within the basic bid figure.

### 3.3 EXCAVATING AND BACKFILL

- A. Provide trenching, backfilling, compaction, repaving or other site restoration as required by the work done in this Division. Minimum trench depth shall be 36" unless otherwise noted. Install 6" wide red vinyl tape with lettering "Caution: Buried Electric Line Below" 18" above all buried electric lines in this contract.
- B. Excavating and backfilling required for installation of electrical work shall be performed in accordance with requirements specified in Division 31. Backfill in excavations outside of building may be excavated material from site containing no rocks over 3/4" in diameter.
- C. Provide all necessary backfill materials, whether from site excavations or from off-site borrows, to completely fill excavations. Coordinate patching of all asphalt or concrete surfaces disturbed by this work with the Owner.
- D. Bored Crossings: Casing shall be smooth steel pipe fabricated in sections for welded joints, of size sufficiently large to provide adequate working space to properly install conduits, continuous butt welded at joints for rigid, watertight encasement, minimum thickness of 0.188" for casing under 14" diameter, and 0.281" for casings 14" and larger diameter.

### 3.4 PROTECTION OF WORK

- A. Protect electrical work, wire and cable, materials and equipment installed under this Division against damage by other trades, weather conditions or any other causes. Equipment found damaged or in other than new condition will be rejected as defective.

- B. Switchgear, panels, light fixtures and electrical equipment shall be kept covered or closed to exclude moisture, dust, dirt, plaster, cement, or paint and shall be free of all contamination before acceptance. Enclosures and trims shall be in new condition, free of rust, scratches or other finish defects. Properly refinish in a manner acceptable to the Architect if damaged.
- C. Including products of other Sections, clean, repair and touch-up or replace when directed, products which have been soiled, discolored or damaged.
- D. Provide for dehumidification of equipment during construction when directed by Architect.
- E. Remove debris from project site upon completion or sooner if directed.

### 3.5 GENERAL INSTALLATION METHODS

- A. Provide raceways and conduits for all electrical system wiring as specified herein. Class II or III systems wiring installed per Article 725 of NEC will be required to be installed in raceway unless otherwise indicated. When open wiring is permitted, raceways will be required in insulated walls and in other inaccessible areas. Low voltage wiring installed in return air plenums shall utilize plenum rated cable.
- B. The extent of the branch circuiting and control wiring shown shall not be changed.
- C. Cross or hash marks on power and lighting conduit runs indicate quantity of No. 12 minimum copper branch circuit conductors unless otherwise noted. Where such marks do not appear, provide conductors as required to provide an operable system, sized per local codes.
- D. Repair surfaces damaged during installation to match adjacent undisturbed areas. Surface preparation, including cleaning and priming, shall be in accordance with the paint manufacturer's requirements.
- E. Adjacent panelboards, component cabinets, terminal cabinets, trench duct, and wire gutter exposed in finished areas shall have matching trim and finish.
- F. In general, the mounting heights shall be as noted on the Drawings or as listed below. Where no heights are indicated, request clarification from the Architect. Consult the Architectural, Structural, and Mechanical Drawings to avoid conflicts prior to roughing in. All dimensions are to the center of the device above finished floor unless specified otherwise. Lighting dimensions are to the bottom of suspended fixtures; mount panelboards 72" to top handle; mount devices above counters, 12" above counter or 4-1/2" above backsplash, whichever is greater; and receptacles in unfinished areas 48".
- G. All raceways and wiring shall be concealed where possible. All wiring devices, recessed light fixtures, etc., shall be flush mounted unless otherwise noted.
- H. Relays, panels, cabinets and equipment shall be level and plumb and installed parallel with structural building lines. All equipment and enclosures shall be suitable for the environmental conditions in which they will operate.

- I. The Drawings do not indicate all items necessary. Provide associated equipment, materials, and labor as required for complete and operable systems.

### 3.6 CUTTING AND PATCHING

- A. Under no conditions are beams, girders, footings or columns to be cut for electrical items unless so shown on Drawings or written approval obtained from the Architect.
- B. Cutting, patching and repairing for the proper installation and completion of the work specified, including plastering, gypsum board, masonry work, concrete work, carpentry work and painting shall be performed by workers skilled in their respective trades.
- C. Follow requirements specified in Division 1.

### 3.7 SLEEVES AND CHASES

- A. Provide necessary rigid conduit sleeves, openings and chases where conduits or cables are required to pass through floors, ceilings or walls. Seal all openings around conduits against leaks and in a manner to maintain the fire rating of the structure penetrated. Prevent unnecessary cutting in connection with the finished work. Make all repairs and seals in a manner acceptable to the Architect.

### 3.8 NOISE CONTROL

- A. The entire electrical system apparatus shall operate at full capacity without objectionable noise or vibration.
- B. Outlet boxes at opposite sides of partitions shall not be placed back-to-back, nor shall straight-through boxes be employed, except where specifically permitted on the Drawings by note, to minimize transmission of noise between occupied spaces.
- C. Contactors, transformers, starters, and similar noise-producing devices shall not be placed on walls which are common to occupied spaces unless specifically called for on the Drawings. Where such devices must be mounted on walls common to occupied spaces, they shall be shock mounted or isolated in such a manner as to effectively prevent the transmission of their inherent noise to the occupied space.
- D. Ballasts, contactors, starters, transformers, and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

### 3.9 EQUIPMENT CONNECTIONS

- A. Provide complete electrical connections for all items of equipment requiring such connections, including incidental wiring, materials, devices and labor necessary for a finished working installation.

- B. Verify the rough-in and wiring requirements for all equipment provided under other Divisions of the work and requiring electrical connections with equipment supplier and installer prior to rough-in. Check the voltage and phase of each item of equipment before connecting. Motor connections shall be made for the proper direction of rotation. Pump motors shall not be test run until liquid is in the system and proper lubrication to all bearings in unit is checked. Minimum size flex for mechanical equipment shall be 1/2". Exposed motor wiring shall be jacketed metallic flex.
- C. Conduit, wire and circuit breaker sizes for mechanical equipment and equipment furnished under other Divisions are based on the equipment ratings of one manufacturer. The equipment actually furnished may be of a different brand with different electrical characteristics. Conduit, wire and circuit breakers shall not be ordered or installed until exact electrical requirements are obtained. Responsibility for this coordination shall rest with the Contractor.

### 3.10 TESTS

- A. Complete each system as shown or specified herein and place in operation except where only roughing-in or partial systems are called for. Each system shall be tested and left in proper operation free of faults, shorts, or unintentional grounds.
- B. After the interior wiring system installation is completed, and at such time as the Owner may direct, the Contractor shall conduct an operating test for approval. The equipment shall be demonstrated to operate in accordance with the requirements of the Specification. The test shall be performed in the presence of the Owner or an authorized representative. The Contractor shall furnish all instruments and personnel required for the tests, and the Owner will furnish the necessary electric power. The Contractor shall submit in writing to the Owner upon completion of the project the measured ground resistance of each ground rod, indicating the location of the rod, the resistance, and the soil conditions at the time the measurements were made.

### 3.11 DEMOLITION AND REMODELING NOTES

- A. NOT USED

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide all conductors, cables, connectors, lugs, cable ties, and terminations for all systems.

### 1.2 QUALITY ASSURANCE

- A. All conductors shall be Underwriters Laboratories, Inc., listed and comply with Fed. Spec. J-C-30B and UL 83. Materials omitted here but necessary to complete the work are to be of comparable quality.

### 1.3 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Deliver conductors and cables in complete coils with UL label and bearing manufacturer's name, wire size, and type of insulation.
- B. Store and handle materials so as not to subject them to corrosion or mechanical damage and in a manner to prevent damage from environment and construction operation.
- C. Deliver conductors No. 10 and smaller in manufacturer's original unopened and undamaged cartons with labels legible and intact.

### 1.4 SUBMITTAL AND RECORD DOCUMENTATION

- A. None required.

## PART 2 - PRODUCTS

### 2.1 CONDUCTORS

- A. Conductors No. 10 AWG and smaller may be soft-drawn, stranded, or solid copper. Conductors larger than No. 10 AWG shall be stranded, soft-drawn copper.
- B. Insulation for new conductors installed in raceways shall be "THWN" for conductors No. 8 AWG or smaller, and "THWN" or "THHN" for conductors No. 6 AWG or larger, or as noted.
- C. Where adverse conductor exposure exists, code-approved insulation suitable for the conditions encountered shall be used unless shown otherwise on the Drawings.
- D. All wire and cable for feeder circuits shall conform to the latest requirements of the current edition of the NEC and shall meet all ASTM Specifications. Wire and cable shall be new and have wire size, grade of insulation, voltage, and manufacturer's name permanently marked on outer covering at regular intervals.



- E. Sizes shall not be less than indicated. Branch circuit conductors shall not be smaller than No. 12 AWG. Class I remote control and signal circuit conductors shall not be less than No. 14 AWG. Class 2 low energy remote control and signal circuit conductors shall not be less than No. 18 AWG.
- F. All insulation shall be rated 600 volts unless noted otherwise.
- G. Acceptable Manufacturers: General Electric, Hatfield, Anaconda, Rome Cable, Essex, Belden, West Penn, or approved.

## 2.2 SPLICES AND TERMINATIONS

- A. All connectors shall be solderless pressure type per Fed. Spec. W-S-610, properly taped. All taped joints shall be with plastic tape, "Scotch 33," applied in half-lap layers without stretching to deform.
- B. Splices shall utilize Scotch "Hyflex" or "Ideal" wing nut connector installed properly. Splices for No. 8 and larger wires shall be made with tin or silver plated copper compression sleeves.
- C. Splices made in handholes and manholes, or underground splices, shall be made water tight with epoxy resin-type splicing kits.

## PART 3 - EXECUTION

### 3.1 CONDUCTORS

- A. Insulation shall be removed with a stripping tool designated specifically for that purpose. All conductors shall be left nick-free.
- B. UL listed pulling compounds may be used with the residue cleaned from the conductors and raceway entrances after the pull is made.
- C. Raceway shall be complete, clean and free of burrs before pulling conductors.
- D. Wire shall not be left extending out of exposed conduit stubs or incomplete raceways where subject to mechanical injury.
- E. Pulleys or blocks shall be used for alignment of the conductors when pulling. Pulling shall be in accordance with manufacturer's specifications regarding tensions, bending radii of the cable and compounds.
- F. Conductors shall be terminated as required.
- G. Conductor sizes for special systems shall be as recommended by the equipment manufacturer except as noted.
- H. Stranded conductors shall not be terminated with post and screw unless compression spade/ring lug is utilized.
- I. 120-volt homeruns over 80 feet in length shall be minimum #10 conductor.

### 3.2 LABELING

- A. Provide color coding of building wiring consistent throughout the work as listed herein, unless required otherwise by local code authority. Band feeder conductors not available in colors where clearly visible at each termination, tape or splice using two full wraps of 3/4" adhesive vinyl tape or equally visible color marking corresponding to the following table.

<u>Less than 250V between phases</u>	<u>251 to 600V btwn phases</u>
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Ground - Green	Ground - Green

- B. Switch legs, travelers, etc., to be consistent with the above phases to which they are connected or may be any other color distinctive from those listed above. Complex control circuits may utilize any combination of colors but the identification shall be by labels throughout. Labeling shall be accomplished by using computer-generated heat shrink labels suitable for the wire size used. In no case will hand lettering or wraparound labels be accepted.
- C. Phase color code to be consistent at all feeder terminations, A-B-C left to right or A-B-C top to bottom.
- D. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made.
- E. Control circuit terminals of equipment shall be properly identified. Terminal and conductor identification shall match that shown on approved shop drawings. Hand lettering or marking is not acceptable.

### 3.3 SPLICES AND TERMINATIONS

- A. Splices are to be made up completely promptly after wire installation. Single wire pigtails shall be provided for fixture and device connections. Wire nuts may be used for fixture wire connections to single wire circuit conductor pigtails.

### 3.4 CONNECTORS

- A. Control and special systems wires shall be terminated with a tool- applied, spade-flared lug when terminating at a screw connection.
- B. All screw and bolt-type connectors shall be made up tight and be retightened after an eight-hour period.
- C. All tool-applied compression connectors shall be applied per manufacturer's recommendations and physically checked for tightness.
- D. Check terminations in all panelboards, switchgear, motor control centers, etc., six months after completion of installation. Supply a confirming letter to the Owner at completion of test.

3.5 TESTS

- A. Perform insulation resistance tests on all feeders and circuits over 100 A, 480 volt and below, with a 1,000 volt megger. The written test report listing the results of the test to be included in the Operating and Maintenance Manuals. Equipment which may be damaged by this test shall be disconnected prior to the test.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide ground system as specified herein, as shown on the Drawings, and as required by NEC and other rules and regulations pertaining to grounding.

### 1.2 SUBMITTAL AND RECORD DOCUMENTATION

- A. None required.

## PART 2 - PRODUCTS

### 2.1 GROUND CONDUCTORS

- A. Equipment or grounding conductors shall be soft drawn copper, stranded per ASTM B8 and, if insulated, shall have green insulation.

### 2.2 GROUNDING BUSHINGS/WEDGES

- A. Sufficient ampacity with grounding conductor set screw connection.

### 2.3 CONNECTOR

- A. Cast, set screw or bolted type.

### 2.4 GROUND RODS

- A. Copper-clad steel, not less than 3/4" in diameter, 8' long, driven full length into the earth.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All grounding conductors shall be sized in accordance with Article 250, Tables 250.66 and 250.122 of the NEC.
- B. Except where specifically indicated otherwise, all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, and neutral conductor of the wiring system shall be grounded.
- C. The ground connection shall be made at the main service equipment and shall be extended to the point of entrance of the metallic water service. Connection to the water pipe shall be made by a suitable ground clamp. If flanged pipes are encountered, connection shall be made with the lug bolted to the street side of the flange connection.
- D. Where the metallic water service is used, it shall be grounded as described by Article 250.52 of the NEC.

- E. Generally, all supplemental grounding electrodes shall be ground rods.
- F. All ground wire connections below finished grade, cast in concrete, or bonding solid wire shall be exothermically welded.
- G. Where there is no metallic water service to the building, ground connections shall be made to driven ground rods on the exterior of the building.
- H. The maximum resistance measured in accordance with IEEE Standard 142 of a driven ground shall not exceed 25 ohms under normally dry conditions. If this resistance cannot be obtained with a single rod, additional rods shall be installed not less than 6' on centers, or if sectional-type rods are used, additional sections may be coupled and driven with the first rod. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Engineer shall be notified immediately.
- I. Grounding conductor connectors shall be made up tight and located for future servicing and to ensure low impedance.
- J. The Contractor shall submit in writing to the Owner upon completion of the project the measured ground resistance of each ground rod, indicating the location of the rod and the resistance and the soil conditions at the time the measurements were made.
- K. Where new circuits are to be served by existing panels with no ground bus, provide supplemental copper ground bus in panel.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide all electrical equipment and wiring with adequate supports of specified type required for a complete installation.

### 1.2 SUBMITTAL AND RECORD DOCUMENTATION

- A. Submit shop drawings indicating details of fabricated products and materials.

## PART 2 - PRODUCTS

### 2.1 FASTENERS

- A. Fastenings shall be by wood screws or screw-type nails to wood; by toggle bolts on hollow masonry units; by expansion bolts on concrete or brick; by machine screws, welded threaded studs, heat-treated or spring steel tension clamps on steel work; for new concrete installation use cast-in-concrete inserts. Kindorf D-255 or approved.
- B. Hammer-driven and trigger-fired anchors may be used only after obtaining specific written authorization from the Architect.

### 2.2 OUTLET BOX SUPPORTS

- A. Wood Stud Walls: Adjustable bar hangers with "C" channel cross section Steel City 6010 series, or approved, or mounted on solid blocking. 4-inch square boxes adjacent to wood studs may be side nailed and back braced with Steel City No. 50 box brace.
- B. Light steel construction, bar hangers with 1-inch long studs between metal studs or metal stud "C" brackets snapped on and tab-locked to metal studs.
- C. Concrete or masonry walls where boxes are not cast in place. Flush anchors or concrete inserts.
- D. Flush Ceiling Outlets: Steel City 6010 series or equal bar hangers.

### 2.3 CONDUIT SUPPORTS

- A. One Hole Malleable Straps: Steel City, Appleton, T&B, Diamond, Raco, or approved.
- B. Conduit Clips: Caddy, Raco, or approved.
- C. Nail-Up Straps: 1/2" through 1", Raco 2252, 2253, 2254, or approved.
- D. Adjustable Hangers for Conduits 1-1/2" and Larger: Steel City C-149 with threaded steel rod of proper size.

- E. Adjustable trapeze hangers to support groups of parallel conduits; Steel City B-905 steel channel, H-119 square washer, C-105 strap, threaded rod. Components of Unistrut, Globe Strut, Harvey Alstrut, Kindorf, Thomas & Betts, or approved.

#### 2.4 HANGER ROD ATTACHMENTS

- A. Side Beam Connector, Kindorf E-244; 90 degree fitting, Kindorf B-916; clamp type anchor clips Kindorf Type "C," Unistrut P2675 or approved, spot type concrete insert Kindorf B-255 with "Galv-Krom" finish.

#### 2.5 SUPPORT CHANNELS

- A. Conduit: Kindorf B-905 with Galv-Krom finish, and C-105 single bolt channel pipe straps.
- B. Lighting: Kindorf B-900 with G-969 closure strip and G-977 swing connector.
- C. Recessed in Concrete: Kindorf D-980 with D-982 anchored end caps and D-983 joiner clips.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Every fastening device and support for electrical equipment (includes fixtures, panels, outlets, conduits, and cabinets) shall be capable of sustaining not less than four times the ultimate weight of the object or objects. Fasten support to the building or a building structural member.
- B. Provide independent supports to the building or building structural member for electrical fixtures, materials, or equipment installed in or on ceiling, walls, or in void spaces and/or over the furred or suspended ceilings. Chain or additional ceiling wires may be used for light fixture supports.
- C. Other crafts' fastening devices shall not be used for the supporting means of electrical, equipment, materials, or fixtures.
- D. Supports and/or fastening devices shall not be used to support more than one particular item.
- E. Vertical support members for equipment and fixtures shall be straight and parallel to building walls.
- F. Examine all equipment locations to determine type of supports required.
- G. Raceways or pipe straps shall not be welded to steel structures.
- H. Holes cut to a depth of more than 1-1/2" in reinforced concrete beams or to a depth of more than 3/4" in concrete joists shall avoid cutting the main reinforcing bars. Holes not used shall be filled.

#### 3.2 BOXES

- A. Boxes and pendants for surface-mounted fixtures on suspended ceilings shall be supported independently of the ceiling supports.
- B. In open overhead spaces, cast metal boxes threaded to raceways need not be separately supported except where used for fixture support; cast metal boxes having threadless connectors and sheet metal boxes shall be supported directly from the building structure or by bar hangers.
- C. Where bar hangers are used, the bar shall be attached to raceways on opposite sides of the box and the raceway shall be supported with an approved fastener not more than 24" from the box.

### 3.3 RACEWAYS

- A. Support conduits within 18" of outlets, boxes, panels, cabinets, couplings, elbows, and deflections. Maximum distance between supports shall not exceed ten (10) foot spacing.
- B. Conduit up to and including 1" EMT may be supported from ceiling fixture wires by conduit clips or other approved devices only with written approval of the installer of the ceiling support system. All other conduit runs shall be secured to the structure by two-hole straps or supported on Kindorf or Unistrut hangers. Wire will not be permitted for supporting conduit. All visible conduit runs will be parallel to the building structural lines.
- C. Anchor conduit installed in poured concrete to the steel reinforcing with No. 14 black iron wire.
- D. In partitions of light steel construction, sheet metal screws may be used, and bar hangers may be attached with saddle-suspended ceiling construction only. Lighting system branch circuit raceways shall be fastened to the ceiling supports.
- E. Support suspended feeder conduits by metal ring or trapeze hangers with threaded steel rods. Wire ties to prevent displacement, using not less than No. 14 iron wire, may be used only for concealed runs in concrete for conduit up to 1-1/4".
- F. At main distribution and surface mounted branch panels and cabinets where conduit exits from the top, provide support channels on wall 24" above panel and at 6'-0" intervals from there on for support of conduits.

END OF SECTION



PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide all raceways, fittings, and boxes of specified type required for complete project. Install all systems in raceways unless specifically noted otherwise. Provide all outlet boxes, junction boxes, pull boxes and special boxes required for pulling of wires, making connections, and mounting of devices or fixtures.

1.2 QUALITY ASSURANCE

- A. Underwriters Laboratories, Inc., listed and NEC approved
- B. All boxes shall be Underwriters Laboratories, Inc., listed. Where special fabrication is required, the work shall be performed by a listed facility in accordance with UL 50, and all products of manufacture shall bear a label. Outlet and junction boxes shall be sized in accordance with NEC requirements for "THHN" wire or as noted on Drawings.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver raceways with Underwriters Laboratories, Inc., label and bearing manufacturer's name on each length.
- B. Deliver fittings in manufacturer's original unopened and undamaged packages with labels legible and intact.

1.4 APPLICATION

- A. Areas of use:

Underground	PVC
Within poured Concrete (except slab-on grade) or CMU	GRC, IMC, PVC
Dry concealed locations	GRC, IMC, EMT
Wet or Dry exposed locations, subject to damage	GRC, IMC
Dry exposed locations, not subject to damage	GRC, IMC, EMT
Hazardous Class I or II	GRC, IMC

- B. Underground conduit shall be minimum 3/4" trade size. PVC shall not be used inside building. Unless otherwise approved, all conduits shall be installed under reinforcing steel.
- C. Where the contractor elects to utilize PVC in lieu of GRC, the contractor shall provide supplemental ground bus in terminating switch and panelboards, and green ground wire in conduit according to code rules.

- D. For the purposes of this section, poured concrete slabs on grade and under-the-building slabs are not classified as dry locations.
- E. Flexible metal conduit will be permitted only where flexibility is necessary. Exceptions are connections to recessed light fixtures. Flexible metal conduit shall be used for connection to all equipment subject to movement or vibration such as motors, transformers, etc. Liquid-tight flexible metal conduit shall be used when moisture may be present and for exposed motor and equipment connections.
- F. Surface raceway may be used only where specifically called for on the Drawings or in the Specifications.
- G. Aluminum conduit is not permitted.

#### 1.5 SUBMITTAL AND RECORD DOCUMENTATION

- A. Submit product data for surface raceway and wireway.
- B. Submit product data for floor boxes. Submit shop drawings for nonstandard boxes, enclosures, and cabinets. Include layout drawings showing components and wiring.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Allied Tube & Conduit, Western Tube & Conduit, Triangle, Bridgeport, AFC, Carlon, Western Plastics, Alflex, or approved substitute. Wiremold, Walker, or approved substitute. Raco, Thomas & Betts, or approved substitute.

#### 2.2 CONDUITS

- A. Galvanized Rigid Conduit (GRC) shall be hot-dip zinc, galvanized inside and out, mild steel pipe manufactured in accordance with UL-6 and ANSI C80.1. All threads shall be galvanized after cutting.
- B. Electrical Metallic Tubing (EMT) shall be steel only and shall comply with UL-797 and ANSI C80.3. Exterior shall be hot-dip zinc galvanized and interior protected by a corrosion-resistant lubricating coating.
- C. Intermediate Metallic Conduit (IMC) shall comply with UL-1242 and ANSI C80.6. Exterior shall be hot-dip zinc galvanized and interior protected by a corrosion-resistant lubricating coating.
- D. Rigid non-metallic conduit (PVC) polyvinyl chloride shall be schedule 40 unless otherwise noted, and shall comply with UL-651 and NEMA TC 2.
- E. Surface raceway shall utilize snap-in cover and fittings as recommended by the manufacturer and shall comply with UL 5 standard. Material and size shall be as indicated on the Drawings.

- F. Flexible metal conduit shall be steel and comply with UL 1 and ANSI standards. Liquid-tight flexible metal conduit shall comply with UL 360 and ANSI standards.

### 2.3 WIREWAYS

- A. Gutters: Steel, painted, square in cross section, preformed knockouts on standard spacing, screw cover, suitable for environment.
- B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.
- C. Exterior wireways and fittings/accessories shall be stainless steel.

### 2.4 FITTINGS

- A. GRC and IMC shall be coupled and terminated with threaded fittings. Ends shall be bushed with insulating bushings equal to T&B 1220 or 1230 series.
- B. Connectors and couplings for EMT shall be steel concrete tight compression type or set screw type with insulated throats on connectors. Indent type connectors shall not be used.
- C. Conduits piercing a building waterproof membrane shall be provided with O-Z type FSR fittings.
- D. Flexible metal conduit shall utilize screw-in type connectors. Couplings and set-screw type connectors are not permitted.
- E. Seal-offs with filler fiber, compound, large removable cover. All components shall be of the same manufacturer.
- F. Expansion Couplings:
  - 1. Exposed Conduit Runs: Expansion couplings shall be weatherproof with external bonding jumper, providing at least 4" longitudinal movement with bushed conduit ends.
  - 2. Concealed Conduit Runs: Expansion couplings shall be water tight with an internal bonding jumper and neoprene construction. The fitting shall allow 3/4" movement in any direction or deflection of 30 degrees from normal.
- G. Locknuts shall be galvanized steel.

### 2.5 BOXES

- A. Boxes for use with raceway systems shall not be less than 4" square and 1-1/2" deep except where shallower boxes required by structural conditions are approved.
- B. Flush and Concealed Outlet Boxes: Galvanized stamped steel with screw ears, knock-out plugs, mounting holes, fixture studs if required.

- C. Surface Outlet Boxes: Galvanized stamped steel same as above for use on ceilings and walls above 14 feet.
- D. Boxes shall be of the cast-metal hub type when located in normally wet locations and when surface mounted on outside of exterior surfaces.
- E. Boxes installed for concealed wiring shall be provided with suitable extension rings or plastic covers as required.
- F. Cast-metal boxes installed in wet locations and boxes installed flush with the outside of exterior surfaces shall be gasketed.
- G. Provide boxes suitable for the intended environment and sized as required to accommodate the equipment within. Exterior boxes shall be stainless steel.
- H. Pull boxes of not less than the minimum size required by the National Electrical Code shall be constructed of code-gauge aluminum or galvanized sheet steel except where cast-metal boxes are required in locations specified above. Boxes shall be furnished with screw-fastener covers. Where several feeders pass through a common pull box, the feeders shall be tagged to indicate clearly the electrical characteristics, circuit number, and panel designation.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Ends of metal conduits shall be reamed and left free of burrs.
- B. Provide pull boxes or vaults where shown or required to limit the number of bends in any conduit to not more than three 90 degree bends, or to ease pulling tension. Use boxes of code-required size with removable covers, installed so that covers will be accessible after work is completed.
- C. Conceal all wiring in finished spaces so far as practicable. Exposed conduit shall be used only in unfinished spaces.
- D. Exposed raceways shall be parallel or at right angles to structural lines, and shall be neatly offset into boxes. Exposed raceways shall follow existing exposed piping/ductwork/conduit paths as far as practicable.
- E. Conduit stubbed from a concrete slab or wall to serve an outlet mounted on a table or to supply a machine shall have a rigid conduit coupling flush with the surface of the slab. Provide plug where conduit is to be used in future.
- F. Keep conduit and raceway closed with suitable plugs or caps during construction to prevent entrance of dirt, moisture, concrete or foreign objects. Raceways shall be clean and dry before installation of wire and at the time of acceptance.
- G. Remove all foreign matter from raceways and pull mandrel through conduits larger than 1-1/2" prior to installing conductors.

- H. Where no conduit size is noted on the Drawings, conduit may be the minimum code permitted size for the quantity of type THHN conductors installed, but in no case smaller than 1/2" trade diameter. Conductor quantities indicated in conduits do not include ground wire unless otherwise noted. Adjust conduit sizes accordingly.
- I. Where the contractor elects to combine branch circuit runs shown as separate runs on the Drawings, provide a minimum 3/4" conduit or increase raceway size to provide a minimum of 25 percent spare capacity for future conductors. Feeder runs shall not be combined.
- J. All conduits installed in concrete construction, underground, or under the building slab shall be minimum 3/4", unless otherwise noted.
- K. Assemble, glue and seal PVC conduit in straight lengths prior to installation in trench.
- L. Seal-offs shall be installed in all conduits which route from warm areas into refrigerated areas.
- M. Install PVC conduit in accordance with manufacturer's instructions. Cut the conduit ends square and apply an approved solvent to clean the joint. Apply an approved cement and allow to set 24 hours before installing conductors.
- N. Conduits shall be fastened to all sheet metal boxes and cabinets with two locknuts where required by the National Electrical Code, where insulating bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, a single locknut and bushing may be used.
- O. A pull wire shall be inserted into each empty raceway in which wiring is to be installed by others. The pull wire shall be of No. 15 AWG zinc-coated steel, or of plastic having not less than 200-pound tensile strength. Not less than 10" of slack shall be left at each end of the pull wire.
- P. Raceway shall not be installed under the fire pits of boilers and furnaces and shall be kept 6" away from parallel runs of flues, steam pipes and hot water pipes.
- Q. Changes in direction of runs shall be made with symmetrical bends or cast-metal fittings. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Crushed or deformed raceways shall not be installed.
- R. Expansion fittings complete with grounding jumpers shall be installed where raceways cross expansion joints, construction joints, sawed joints, and where shown.
- S. Where conduit is shown stubbed into a telephone, computer or communication terminal area, conduit shall be stubbed up 6" above floor or 12" below ceiling and terminated with insulating bushings.
- T. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate head room, working clearance, and access to both boxes and other equipment.
- U. The end of a conduit stub shall have an insulated bushing.

- V. Pack spaces around conduits with polyethylene backing rods and seal with polyurethane caulking to prevent entrance of moisture where conduits are installed in sleeves or block-outs penetrating partitions.
- W. Install intumescent material around ducts, conduits, etc., to prevent spread of smoke or fire where installed in sleeves or block-outs penetrating fire-rated barriers. An alternate method utilizing intumescent materials in caulk and/or putty form may be used.
- X. Outlet boxes shall be designed for the intended use. Flush outlet boxes shall be installed flush with finished surface lines.
- Y. Outlet boxes on flex connected fixtures shall be installed within five feet of conduit knock-out in fixture.
- Z. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate head room, working clearance, and access to both boxes and other equipment.

### 3.2 INSTALLING CONDUIT BELOW SLAB-ON-GRADE OR IN THE GROUND

- A. All electrical wiring below slab-on-grade shall be protected by a conduit system.
- B. No conduit system shall be installed horizontally within concrete slab-on-grade. For slab-on-grade construction, horizontal runs of rigid plastic shall be installed below the floor slab.
- C. Conduit passing vertically through slab-on-grades shall be coated rigid steel.
- D. Slope conduits away from terminal equipment; drain away from the building interior.
- E. Rigid steel or IMC conduits, metal boxes, and couplings installed below slab-on-grade or in the earth shall be field-wrapped with 0.010" pipe-wrapping plastic tape applied with a 50 percent overlay, or shall have a factory applied plastic resin, epoxy, or coal-tar coating system. Zinc coating may be omitted from rigid steel conduit, or IMC which has a factory-applied epoxy system. All joints shall be threaded, sealed and wrapped with tape to prevent entry of water. Use 20 mil pipe wrapping tape to cover wrench marks, field cuts, or abrasions to the outer factory installed anti-corrosion covering.
- F. Provide duct seal at ends of all underground and under-slab conduits.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Clearly and properly label the complete electrical system to indicate the loads served or the function of each item of equipment connected under this work.

### 1.2 SUBMITTAL AND RECORD DOCUMENTATION

- A. None required.

## PART 2 - PRODUCTS

### 2.1 IDENTIFICATION MARKERS

- A. Unless otherwise specified, all identification nameplates shall be made of laminated three-ply plastic in accordance with Fed. Spec. L-P-387 equal to "Lamicoid." Nameplates shall be minimum 1/16" thick, with black outer layers and a white core, red outer ply for all emergency applications. Edges shall be chamfered.
- B. Provide identification nameplates for starters, switchboards, safety switches, panelboards, motor control centers, transformers, equipment (air handling units, exhaust fans, pumps, etc.), with a minimum of 1/4" high letters.
- C. Provide identification nameplates for control power transformers, control devices (relays, contactors, etc.), with a minimum of 1/8" high letters.
- D. Where switches control remote lighting, exhaust fans, or power outlets, or where switches in the same gang (two or more) serve different purposes, such as light, power, intercom, etc., or different areas, such as corridor and outlet, furnish engraved cover plates with 1/8" black letters indicating function of each switch or outlet.

## PART 3 - EXECUTION

### 3.1 LABELING

- A. Major items of electrical equipment and major components shall be permanently marked with an identification nameplate to identify the equipment by type or function and specific unit number as shown on the Drawings.
- B. Provide typewritten branch panel schedules with protective clear, transparent covers accounting for every breaker installed. Use actual room designations assigned by name or number near completion of the work, and not the designation on the construction drawings. Minimum panel schedule width shall be 4" with 1/4" height allowed for each circuit line. Panel schedules shall be the type which install in a metal frame or pocket. Panel schedules shall be of the odd/even sequence (1-3-5-7-9... and 2-4-6-8-10...).

- C. Identify service entrance and distribution switchboards with engraved nameplate corresponding with the plans, mounted on the face of the switchboard. Identify each feeder, breaker, and switch with engraved nameplate corresponding with the plans.
- D. Identify branch panels with engraved nameplate corresponding with the main or subdistribution panel labeling, mounted on the face of the door. No brand labels or other markings shall be on the outside of the panels.
- E. Label all disconnect switches, relays, contactors, starters and time switches indicating voltage, amperage, power panel source, circuit number and equipment served with laminated plastic label.
- F. Nameplates shall be secured with screws or pop rivets. Adhesive-only fasteners shall not be permitted.

END OF SECTION



## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide the system of conduits, pull boxes, outlet boxes, and other associated equipment specified herein and as shown on the Drawings for telephone and computer data.
- B. All wiring, instruments, terminal equipment, etc., will be provided by others.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Outlet Boxes: 4" square, 2-1/8" deep minimum with 1-gang device ring, with a 1" conduit routed to accessible ceiling space.
- B. Conduits: 1" minimum to outlets or sized for cable load per NEC and industry standards.
- C. Pull Boxes: Sheet metal, primed and painted, screw cover.
- D. Telephone terminal backboards shall be 3/4" thick plywood with a grade of "AB" or higher. Mount with best side out. Backboards shall be smooth finished, sanded surface without significant blemishes. Prime and paint with two coats of white fire retardant paint, Benjamin Moore IronClad® Retardo®, or approved alternate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Conduit bends shall be large radius field bends. No run shall have more than 270 degrees of total bend radius unless a suitable pull box is installed. Pull boxes, cast type fittings or sharp bends shall not be installed in utility service raceway systems unless specifically shown on the Drawings or approved by the telephone company.
- B. Where conduits are shown stubbed into a terminal area, conduits shall be stubbed up 6" above floor or 12" below ceiling and terminated with insulating bushings. Provide 80# test polypropylene pull line in all conduits for telephone company use.
- C. Anchor plywood terminal boards adequately to wall for telephone terminal use.
- D. Provide double duplex receptacles in locations on the backboard as specified on the Drawings. Coordinate exact location with Owner's vendor or utility representative prior to rough-in.

- E. Provide 3/4" raceway and #6 copper wire with green insulation from telephone terminal backboard to main service ground bus for telco ground, unless indicated otherwise on the Drawings.
- F. Provide blank cover plate at all telephone or computer outlet locations not covered by Owner's tele/data installer, finish as selected by Architect.
- G. Stub conduit with bushing and pull wire into accessible ceiling space from each telephone and computer outlet. Outlets shall NOT be daisy chained.
- H. Telephone or computer data outlet boxes shall be placed at the same height as adjacent power outlets.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide the secondary service entrance and metering equipment as specified herein and as shown on the Drawings.

1.2 COORDINATION

- A. Coordinate all aspects of the incoming electrical utility service with the serving utility representative.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect equipment against damage and moisture. Store materials off ground.
- B. Deliver equipment with UL label and bearing manufacturer's name.

1.4 QUALITY ASSURANCE

- A. Underwriters Laboratories, Inc., listing/approval.
- B. National Electrical Code with state and local amendments.
- C. Serving utility requirements and guidelines.

1.5 SUBMITTAL AND RECORD DOCUMENTATION

- A. Submit product data for products specified in this Section. Include dimensions, ratings, and data on features and components.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

- A. Reference Section 262413, Switchboards.

2.2 PANELBOARDS

- A. Reference Section 262416, Panelboards.

2.3 UTILITY METERING EQUIPMENT

- A. Fabricated compartment and section meeting utility company's requirements.
- B. Bus work shall include provisions for mounting utility company current transformers and potential transformers or potential taps as required by the utility company.

2.4 CURRENT TRANSFORMER CABINET

- A. Enclosure and cover to be fabricated from code gauge galvanized steel.
- B. Enclosure body to have mounting holes on back.
- C. Enclosure shall have mounting studs for utility current transformer mounting equipment.
- D. Cover shall be held secure by sliding it under the top end flange and fastening.
- E. Cover mounting studs and wing nuts shall have a utility sealing hole provision as well as a padlocking provision for sealing the cover to the enclosure.
- F. Hinged cover handles shall fold against the cover when not used.
- G. A ground lug shall be mounted on the inside bottom end of each cabinet.
- H. Shall have ANSI 49 gray enamel paint finish.
- I. Shall be UL 414 listed, type 3R, where installed outside.
- J. Acceptable Manufacturer: Circle AW or equal.

#### 2.5 CT RATED METER SOCKET

- A. Enclosure and cover to be fabricated from code gauge galvanized steel.
- B. Shall have lug range for #14 to #6 copper.
- C. Shall have test perch drilled and tapped for test switches.
- D. Shall have AWSR sealing ring.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install panels, cabinets and equipment level and plumb, parallel with structural building lines. Cover shall fit neatly without gaps, openings or distortion.
- B. Install in accordance with the manufacturer's installation instructions.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide switchboards of a type indicated and specified herein, at locations shown on the Drawings
- B. Utilization voltages shall be as noted on the one-line diagram or as indicated on the Drawings.

### 1.2 QUALITY ASSURANCE

- A. Underwriters Laboratories, Inc., listing/approval.
- B. U.L. Standard UL 891.
- C. National Electrical Code.
- D. NEMA Standard PB2.

### 1.3 SUBMITTAL AND RECORD DOCUMENTATION

- A. Shop drawings shall indicate the following:
  - 1. Front and side enclosure elevations with overall dimensions shown.
  - 2. Conduit entrance locations and requirements.
  - 3. Nameplate legends.
  - 4. Size and number of horizontal bus bars per phase.
  - 5. Neutral and ground.
  - 6. One-line diagrams.
  - 7. Equipment schedule.
  - 8. Switchboard instrument details.

## PART 2 - PRODUCTS

### 2.1 DISTRIBUTION ASSEMBLY

- A. Each switchboard section shall be freestanding, dead-front type, rear-aligned, front accessible, and completely metal enclosed. Top and bottom conduit area shall be clearly shown and dimensioned on the Shop Drawings. All front plate devices used for mounting switches or installed and laced with flexibility at the hinged side. Formed removable closure plates shall be used on the front, rear, and sides. All closure plates are to be single-tool, screw removable. Overcurrent devices shall be of size and type as indicated on the Drawings.
- B. The paint finish shall be two coats gray enamel over a rust-inhibiting phosphate primer.
- C. Main lugs shall be tool-applied compression-type.

- D. The bus bars shall be tin-plated aluminum and rigidly braced for 65,000 amperes RMS symmetrical at rated voltage and sized as indicated on the Drawings. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Provide a full capacity neutral bus. All unused space shall be bussed and left ready for future use.
- E. A ground bus shall be firmly secured to each vertical section.
- F. Board shall be service entrance rated where used as service entrance equipment.
- G. All devices mounted in the switchboard shall have short circuit ratings to meet or exceed that of the switchboard.
- H. Switchboard shall be tested, listed, and marked for use with a UL witnessed and recognized fuse/breaker combination.
- I. Acceptable Manufacturers: Siemens, Square D, Cutler-Hammer/Westinghouse, and GE.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Distribution boards shall be free from surface and finish defects. All nameplates, labels, screws, bolts or other hardware shall be in place prior to acceptance.
- B. Install panels, cabinets and equipment level and plumb, parallel with structural building lines. Switchgear panels and all electrical enclosures shall fit neatly without gaps, openings or distortion.
- C. Neatly and securely lace the conductors of each circuit together as a group and not combined with other feeders. Support laced cables and securely tie at intervals no greater than three feet to support devices built into the switchgear assembly. No loose, unsupported wire or cable will be permitted, and lugs shall not support the conductor weight.
- D. Provide engraved nameplates under the provisions of Section 16195, Electrical Identification.

#### 3.2 CONCRETE BASE

- A. Construct concrete equipment base 6" larger than footprint of cabinets and 3-1/2" tall. Where switchboard is outside, equipment base shall extend 4 feet in front of equipment as a flat level working surface.
- B. Form concrete base using framing lumber with form-release compounds. Chamfer top edges and corners.
- C. Install reinforcing bars and place anchor bolts and sleeves using manufacturer's installation template.

- D. Place concrete and allow to cure before installation of equipment.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide at locations shown on the Drawings, panelboards of a type indicated and specified herein.

1.2 COORDINATION

- A. Coordinate with other Trades affecting or affected by Work of this Section.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect against damage and moisture. Store materials off ground. Remove damaged materials from site immediately after detection.
- B. Deliver with UL label and bearing manufacturers name. Panelboard exterior trim separately packaged to prevent damage during delivery and storage on site.
- C. Store and handle panelboards so as not to subject them to corrosion or mechanical damage and in a manner to prevent damage from environment and construction operation.

1.4 QUALITY ASSURANCE

- A. Underwriters Laboratories, Inc. listing/approval.
- B. Underwriters Laboratories, Inc. Standards.
  - 1. Panelboards - UL67.
  - 2. Cabinet and Boxes - UL50.
- C. National Electrical Code.
- D. NEMA Standard - PB1.

1.5 SUBMITTAL AND RECORD DOCUMENTATION

- A. Approval documents shall include drawings. Drawings shall contain overall panel dimensions, interior mounting dimensions, and wiring gutter dimensions. The location of the main, branches, and solid neutral shall be clearly shown. In addition, the drawing shall illustrate one-line diagrams with applicable voltage systems. Include copy of panel schedules in record documents.

PART 2 - PRODUCTS

2.1 PANELBOARDS



- A. Panels shall be factory pre-assembled using tin-plated aluminum bussing and bolt-on circuit breakers. Separate feeder lugs shall be provided for each feeder conductor. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machine drilling or tapping.
- B. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.
- C. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. A separate ground bus shall be included in all panels. There shall be a neutral and ground bus space for each breaker location listed as space.
- D. Panelboard boxes shall be at least 20" wide, made from galvanized steel. Provide minimum gutter space in accordance with National Electrical Code. Maximum panel depth shall be 5-3/4", unless otherwise shown or specifically approved by the Owner. Surface panel boxes shall be painted to match trim.
- E. Switching device handles shall be accessible. Doors and panelboard trims shall not uncover any live parts.
- F. All panel doors shall be provided with a flush type combination catch and lock with two milled keys. On doors more than 48" high, a three point combination catch and lock shall be provided with a vault type handle. All locks shall be keyed alike. All panel trims shall be "hinged front" construction, meaning trim has a piano hinge down one side, door opens by a single latch, and entire trim hinges open by removing two screws.
- G. Single pole breakers shall be full module size; two poles shall not be installed in a single module. Each breaker shall be securely fastened to prevent movement and trims shall fit neatly and tightly to the breaker assembly. Interrupting capacity shall be minimum 10,000 ampere or as indicated on the Drawings and shall conform to Fed. Spec. W-C-375. All 15 or 20 ampere single pole breakers shall have "switching-duty" capability.
- H. Permanent numbers, engraved, stamped or painted shall be affixed to each pole next to breakers. Stick-on numbers are not acceptable.
- I. Panelboards shall be coated with a rust inhibiting phosphate primer and two coats of light gray enamel. Trims to be separately packed and protected from scratching and marring.
- J. Panelboards shall be tested, listed, and marked for use with a UL witnessed and recognized fuse/breaker combination.

## 2.2 ACCEPTABLE MANUFACTURERS

- A. Siemens, Square D, Cutler-Hammer/Westinghouse, and GE.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Breaker handle guards shall be provided on each circuit supplying obviously constant loads to prevent accidental shutting off. Such loads are contactor controlled circuits, freeze protection, etc.
- B. Provide typed schedules as in Section 260553.
- C. Provide engraved laminated name plates under the provisions of Section 260553.
- D. Provide one 3/4" spare conduit stubbed into an available accessible space above for every three single pole spare or space in new flush branch panels.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide all wiring devices and finish plates as required unless specifically indicated otherwise.

### 1.2 QUALITY ASSURANCE

- A. Underwriters Laboratories, Inc., listed and NEC approved.
- B. Wiring devices shall be specification grade, with special devices as noted on the Drawings. Should the Drawings indicate a device other than those listed herein, such device shall be of same grade and manufacture as specified below.
- C. All lighting switches and duplex receptacles installed shall be from the same manufacturer and have identical appearance characteristics.

### 1.3 SUBMITTAL AND RECORD DOCUMENTATION

- A. Submit product data for wiring devices and cover plates.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Wall Switches: 20 ampere, 120/277 volt AC, quiet type, Hubbell HBL1221 Series, color as selected by Architect. Single pole, double pole, 3-way, locking, or other type as indicated. Switches connected to emergency circuits shall be red.
- B. Receptacles: Single and duplex receptacles shall be rated 20 amperes, 125 volts, two-pole, three-wire, grounded type, Hubbell HBL5362 Series. Receptacles shall have nylon faces, one-piece brass mounting strap with integral ground contacts and bypass power contacts; color as selected by Architect. Receptacles connected to emergency circuits shall be red.
- C. Receptacles with ground fault interrupters shall be in accordance with UL 943.
- D. Special purpose or heavy duty receptacles shall be of the type and of ratings and number of poles indicated or required for the anticipated purpose. Contact surfaces may be either round or rectangular. One appropriate straight or angle-type plug shall be furnished with each receptacle. Locking facilities, where indicated, shall be accomplished by the rotation of the plug.
- E. Device plates of the one-piece type shall be provided for all outlets and fittings to suit the devices installed. Plates on unfinished walls and on fittings shall be of zinc-coated sheet steel, cast metal, or impact resistant plastic having rounded or beveled edges. Plates on finished walls shall be impact-resistant plastic, color as selected by the Architect. Plates on emergency receptacles and switches shall be red.

- F. Receptacles in wet locations shall be in a weatherproof enclosure, the integrity of which is not affected when the receptacle is in use. The enclosure shall be of high-impact polycarbonate construction, with a keyhole hinge without a spring and other metal parts, with a gasketless translucent lid that is lockable and tinted and has large cord openings. The enclosure shall be one or two-gang, and shall be securely secured to the receptacle box with tamper-proof fasteners through factory-drilled or field-drilled through factory-prepared drill points. Bell "Raytite II", Intermatic WP1000 series, or equal.
- G. Tamper-resistant (child-proof) receptacles shall be a type which contains internal contacts which require the presence of both blades to energize the receptacle, and shall be UL 498 listed. Hubbell #HBLSG62H or equal.

## 2.2 ACCEPTABLE MANUFACTURERS

- A. Hubbell, Bryant, P&S, Leviton, and Cooper.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Devices and finish plates to be installed plumb with building lines.
- B. Finish plates and devices not to be installed until final painting is complete. Scratched or splattered finish plates and devices will not be accepted.
- C. Wall mounted receptacles shall be installed vertically at centerline height shown on the Drawings unless otherwise specified.
- D. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch.
- E. All outlets shall have a cover plate. Provide blank cover plate to match surrounding area if none other is specified.
- F. In general, lighting switches shall be installed on latch side of doorway.

### 3.2 TESTS

- A. Test all receptacles for line to line, line to neutral, line to ground, and neutral to ground, opens or shorts, and correct defective wiring.

3.3 LABELING

- A. See Section 26 05 53, Identification for Electrical Systems.

END OF SECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. Provide overcurrent protective devices of a type as specified herein.
- B. Provide disconnect switches of a type as specified herein and where required by the National Electrical Code. Provide fused or unfused switches as required by equipment manufacturer or circuit requirements.

### 1.2 QUALITY ASSURANCE

- A. Underwriters Laboratories, Inc., listed.
- B. The circuit breaker(s) referenced herein shall be designed and manufactured according to the latest revision of the following standards.
  - 1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches
  - 2. UL 489 - Molded Case Circuit Breakers and Circuit Breaker Enclosures
  - 3. UL 943 - Standard for Ground Fault Circuit Interrupters
  - 4. CSA C22.2 No. 5.1 - M91 - Molded Case Circuit Breakers
  - 5. NEC

### 1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment with Underwriters Laboratories, Inc. label and bearing manufacturer's name.

### 1.4 SUBMITTAL AND RECORD DOCUMENTATION

- A. Submit product data for each disconnect switch, circuit breaker, and fuse type, including descriptive data, outline drawings with dimensions, time-current curves, let-through current curves for fuses with current limiting characteristics, and coordination charts and tables and related data.

## PART 2 - PRODUCTS

### 2.1 MOLDED CASE CIRCUIT BREAKERS

- A. General Requirements
  - 1. Circuit breakers shall be constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
  - 2. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.
  - 3. The circuit breaker handle shall reside in a tripped position between ON and OFF to provide local trip indication. Circuit breaker escutcheon shall be clearly marked ON and OFF in addition to providing International I/O markings.

4. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker.
5. Each circuit breaker larger than 100A shall be equipped with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit breaker tripping mechanism for maintenance and testing purposes.
6. Circuit breakers shall be factory sealed with a hologram quality mark and shall have date code on face of circuit breaker.
7. Branch circuit breakers exposed to fault currents higher than their AIC rating shall be series-rated with upstream feeder breaker, unless noted otherwise on Drawings. Circuit breaker/circuit breaker and fuse/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end use equipment along with the statement "Caution - Series Rated System. \_\_\_\_\_A Available. Identical Replacement Component Required".
8. Manufacturer shall provide electronic and hard copy time/current characteristic trip curves (and  $I_p$  &  $I^2t$  let through curves for current limiting circuit breakers) for each type of circuit breaker.
9. Circuit breakers shall be equipped with UL Listed electrical accessories as noted on the Drawings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON and OFF position.
10. All circuit breakers shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.
11. Circuit breakers shall have factory installed mechanical lugs. All circuit breakers shall be UL Listed to accept field installable/removable mechanical type lugs. Lug body shall be bolted in place; snap in design not acceptable. All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded copper conductors.
12. All circuit breakers shall be capable of accepting bus connections.
13. Circuit breakers used for motor disconnects and not in sight of the motor controller shall be capable of being locked in the open (OFF) position.
14. Acceptable Manufacturers: Siemens, Square D, Cutler-Hammer/Westinghouse, and GE.

B. Thermal-Magnetic Circuit Breakers

1. Circuit breakers shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.
2. Thermal trip elements shall be factory preset and sealed. Circuit breakers shall be true rms sensing and thermally responsive to protect circuit conductor(s) in a 40 deg C ambient temperature.
3. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker.
4. Standard two- and three-pole circuit breakers up to 250 amperes at 600 VAC shall be UL Listed as HACR type.
5. Combination-type arc-fault circuit interrupter circuit breakers shall be UL 1699 listed.

C. Equipment Ground Fault Protection (in Thermal Magnetic Circuit Breakers)

1. Where indicated on the Drawings, circuit breakers shall be equipped with a Ground Fault Module.
2. Ground fault sensing system shall be modified zero sequence sensing type.
3. The ground fault system shall require no external power to trip the circuit breaker.
4. Companion circuit breaker shall be equipped with a ground-fault shunt trip.
5. The ground fault sensing system shall be suitable for use on grounded systems. The ground fault sensing system shall be suitable for use on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.
6. Ground fault pickup current setting and time delay shall be field adjustable. A switch shall be provided for setting ground fault pickup point. A means to seal the pickup and delay adjustments shall be provided.
7. The ground fault sensing system shall include a ground fault memory circuit to sum the time increments of intermittent arcing ground faults above the pickup point.
8. A means of testing the ground fault system to meet the on-site testing requirements of the NEC shall be provided.
9. Local visual ground fault trip indication shall be provided.
10. Where noted on Drawings, the ground fault sensing system shall be provided with zone selective interlocking communication capabilities compatible with other thermal magnetic circuit breakers equipped with ground fault sensing, electronic trip circuit breakers with integral ground fault sensing and external ground fault sensing systems.
11. The companion circuit breaker shall be capable of being group mounted.
12. The ground fault sensing system shall not affect interrupting rating of the companion circuit breaker.

D. Electronic Trip Circuit Breakers

1. Where indicated on Drawings, provide electronic trip circuit breakers per the following.
2. Breakers shall have a microprocessor-based tripping system which consists of three current sensors, a trip unit, and a flux-transfer shunt trip. The trip unit shall use microprocessor-based technology to provide the adjustable time-current protection functions. True RMS sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time delay settings are reached.
3. Interchangeable rating plugs shall establish the continuous trip ratings of each circuit breaker. Rating plugs shall be fixed type as indicated. Rating plugs shall be interlocked so they are not interchangeable between frames, and interlocked such that a breaker cannot be closed and latched with the rating plug removed. Circuit breakers shall be UL listed to carry 80% of their ampere rating continuously.
4. System coordination shall be provided by the following microprocessor-based programmable time-current curve shaping adjustments. The short-time pick-up adjustment shall be dependent on the long-time pick-up setting.
  - a. Programmable long-time pick-up.
  - b. Programmable long-time delay with selectable  $I^2t$  and  $I^4t$  curve shaping.



- c. Programmable short-time pick-up.
- d. Programmable short-time delay with selectable flat or  $I^2t$  curve shaping and zone selective interlocking.
- e. Programmable instantaneous pick-up.
- f. Programmable ground fault pick-up trip or alarm.
- g. Programmable ground fault delay with selectable flat or  $I^2t$  curve shaping and zone selective interlocking.

The microprocessor-based trip unit shall have a powered/unpowered selectable thermal memory to provide protection against cumulative overheating should a number of overload conditions occur in quick succession.

- 5. Means to seal the trip unit adjustments in accordance with the NEC shall be provided.
- 6. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.
- 7. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. Indication of inherent ground fault current flowing in the system shall be provided on circuit breakers with integral ground fault protection. All current values shall be displayed in true rms with 2% accuracy.
- 8. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
- 9. The trip system shall included a Long Time memory circuit to sum the time increments of intermittent overcurrent conditions above the pickup point. Means shall be provided to reset Long Time memory circuit during primary injection testing.
- 10. Circuit breakers shall be equipped with back-up thermal and magnetic trip system.
- 11. Circuit breaker trip system shall be equipped with an externally accessible test port for use with a Universal Test Set. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.

## 2.2 FUSES

### A. Fuses 0 through 600 amperes:

- 1. Circuits protected with fuses 0 through 600 amperes shall be protected by current-limiting Class RK1 or J dual-element time-delay fuses.
- 2. All fuses shall have separate overload and short-circuit elements.
- 3. Fuses shall incorporate a spring activated thermal overload element that has a 284 degrees Fahrenheit melting point alloy.
- 4. The fuses shall hold 500% of rated current for a minimum of 10 seconds with an interrupting rating of 300,000 amperes RMS symmetrical, and be listed by a nationally recognized testing laboratory.
- 5. Peak let-through currents and  $i^2t$  let-through energies shall not exceed the values established for Class RK1 or J fuses.

### B. Fuses 601 through 6000 amperes.

- 1. Circuits protected with fuses 601 through 6000 amperes shall be protected by current-limiting Class L time-delay fuses.

2. Fuses shall employ "O" rings as positive seals between the end bells and the glass melamine fuse barrel.
3. Fuse links shall be pure silver (99.9% pure) in order to limit the short-circuit current let-through values to low levels and comply with NEC Sections requiring component protection.
4. Fuses shall be time-delay and shall hold 500% of rated current for a minimum of 4 seconds, clear 20 times rated current in 0.01 seconds or less, with an interrupting rating of 300,000 amperes RMS symmetrical, and be listed by a nationally recognized testing laboratory.
5. Peak let-through currents and  $i^2t$  let-through energies shall not exceed the values established for Class L fuses.

C. Spares:

1. Upon completion of the project, the contractor shall provide the owner with the following:
  - a. 10% (minimum of 3) of each type and rating of installed fuses shall be supplied as spares.
  - b. Spare fuse cabinet(s) shall be provided to store the above spares.

D. Acceptable Manufacturers: Bussman, Littelfuse, and Gould-Shawmut.

2.3 DISCONNECTS

- A. Enclosed safety switches shall be horsepower rated in conformance with Table III or Fed. Spec. W-S-865. Switches shall disconnect all ungrounded conductors.
- B. Safety and disconnect switches shall be NEMA type HD (heavy duty), quick-make, quick-break, dual rated with electrical characteristics as required by the system voltage and the load served. Switches shall be equipped with a defeatable cover interlock. Operating handles shall be located to side of switches.
- C. Enclosures shall be NEMA 1 for indoor use, unless specifically noted otherwise, NEMA 3R where installed exposed to the weather or designated by the subscript "WP," and explosionproof where designated with the subscript "EP" or as required by the environment. Exterior enclosures shall be stainless steel.
- D. Disconnects shall be fusible or non-fusible as required by function or code. Equip all fusible disconnects with dual element fuses required by the equipment served. Coordinate fuse sizes at the time equipment is connected. Adjust fuse sizes if necessary to accommodate actual equipment installed. In no case shall fuses be sized smaller than the starter heaters on motor circuits.
- E. For single-phase motors, a single- or double-pole toggle switch, rated only for alternating current will be acceptable for capacities less than 30 amperes, provided the ampere rating of the switch is at least 125 percent of the motor rating.
- F. All disconnects shall be of same manufacturer.
- G. Switches identified for use as service equipment are to be labeled for this application.

- H. Switches used for motor disconnects and not in sight of the motor controller shall be capable of being locked in the open (OFF) position.
- I. Acceptable Manufacturers: Square D, Siemens, Cutler-Hammer/Westinghouse, and GE approved.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install overcurrent protective devices as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.
- C. Fasten circuit breakers without causing mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cabling.
- D. Inspect circuit breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.
- E. Adjust all adjustable/programmable features of electronic trip circuit breakers in accordance with results of electrical power system studies. Reference Section 26 05 73.
- F. Fuses shall not be installed until equipment is ready to be energized. This measure prevents fuse damage during shipment of the equipment from the manufacturer to the job site, or from water that may contact the fuse before the equipment is installed.
- G. Install safety and disconnect switches where indicated, in accordance with the manufacturer's written instructions, the applicable requirements of NEC and the National Electrical Contractors Association's "Standard of Installation," and in accordance with recognized industry practices to ensure that products serve the intended function.
- H. Install disconnect switches used with motor-driven appliances, motors, and controllers within sight of the controller position and within 25 feet.
- I. Circuit breakers shall be combination-type arc-fault circuit interrupter where serving dwelling unit areas as required by the NEC.

#### 3.2 TESTING

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide all lighting outlets indicated on the Drawings with a fixture of the type designated and appropriate for the location. Outlet symbols on the Drawings without a type designation shall have a fixture the same as those used in similar or like locations.
- B. Provide lamps for all fixtures.
- C. Coordinate installation of fixtures with the ceiling installation and all other trades to provide a total system that is neat and of orderly appearance.

1.2 QUALITY ASSURANCE

- A. Fixtures shall conform to the following specifications.
- B. Manufacturers specified are indicative of the general type and performance desired and are not intended to restrict selection to fixtures of any particular manufacturer. Fixtures of similar designs and equivalent light distribution and brightness characteristics, and of equal finish and quality will be acceptable if approved by the Architect prior to the bid.
- C. Equality shall be determined by comparisons of performance, construction, installation ease, maintenance, and appearance.
- D. All light fixtures shall be UL listed and labeled.

1.3 SUBMITTAL AND RECORD DOCUMENTATION

- A. Submit product data describing fixtures, lamps, ballasts, and emergency lighting units. Arrange product data for fixtures in order of fixture designation.
- B. Include data on features and accessories and the following information.
  - 1. Outline drawings of fixtures indicating dimensions and principle features.
  - 2. Electrical ratings and photometric data with specified lamps and certified results of laboratory tests.
  - 3. Data on batteries and chargers of emergency lighting units.
- C. Submit shop drawings from manufacturers detailing nonstandard fixtures and indicating dimensions, weights, methods of field assembly, components, features, and accessories.

PART 2 - PRODUCTS

2.1 LED FIXTURES

- A. General:

1. LED lighting fixtures shall be in accordance with IED, NFPA, UL, as shown on the Drawings and as in these Specifications.
2. LED drivers shall include the following features unless otherwise indicated:
  - a. Power factor: > 0.9 nominal
  - b. Input Voltage: 120V – 277V, 60 Hz
  - c. Total Harmonic Distortion: < 20%
  - d. Temperature Rating: 0 deg C – 40 deg C
  - e. Integral short circuit, open circuit, and overload protection.
3. LED modules shall include the following features unless otherwise indicated.
  - a. Comply with IES LM-79 and LM-80 requirements.
  - b. Minimum 80 CRI and color temperature 4000 deg K unless otherwise specified in Lighting Fixture Schedule/List.
  - c. Minimum Rated Life: 70,000 hours per IES L70, unless otherwise specified in Lighting Fixture Schedule/List.
  - d. Light output initial lumens as specified in Lighting Fixture Schedule/List.
  - e. LED modules shall be field replaceable and contain quick-disconnects.
4. LED lighting fixtures shall have available digital IES files from a NVLAP accredited testing laboratory in accordance with IESNA LM-79, which specifies the entire luminaire as the source, resulting in an efficiency of 100%. Lighting fixtures that do not have these test results available will not be accepted.

## 2.2 FLUORESCENT FIXTURES

- A. not used.

## 2.3 RECESSED FIXTURES

- A. In insulated ceilings, recessed fixtures to be equipped with “IC” rated housing or with a field fabricated fireproof box (metal, sheet rock, etc.), complying fully with all clearance requirements.
- B. Recessed troffers shall be as follows:
  1. Diffusers shall be pattern 12 extruded clear acrylic plastic, 0.125" overall thickness, unless otherwise specified in the fixture schedule by catalog number or remarks. Door shall be securely closed by use of enclosed cams.
  2. Finish shall be white baked enamel, unless otherwise specified with a minimum average reflectance of 85% on all exposed and light reflecting surfaces.
  3. Housing shall be 22-gauge minimum. Overall depth shall be 4-1/2" minimum. Spacing from bottom of lamp to top of lens shall be 1-7/8" minimum.

## 2.4 INCANDESCENT FIXTURES

- A. Conform to UL 1571.

- B. Fixture dimensions shall be proper for the various wattages noted on the plans and as recommended by the fixture manufacturer or as specified.
- C. Lamps shall be inside frosted, 120 V rated except where otherwise specified. Provide reflector lamps for fixtures designed and cataloged for such lamps unless otherwise specified, 120 V rated. Lamps shall be manufactured by General Electric, Osram/Sylvania, or Philips.
- D. Recessed incandescent fixtures shall have thermal protection and shall be factory identified as thermally protected, complying fully with NEC 410-65C. Thermal protection must comply with UL #1571. In insulated ceilings, equip each fixture with a field or factory fabricated fireproof box (metal, sheet rock, etc.), complying fully with all clearance requirements and NEC 410-66.

## 2.5 TRACK LIGHTING SYSTEMS

- A. Not used.

## 2.6 HIGH INTENSITY DISCHARGE (HID) FIXTURES

- A. Not used.

## 2.7 EMERGENCY LIGHTING

- A. Wall Packs:
  - 1. Emergency wall packs shall comply with UL 924 and be self-contained units, complete with two adjustable lensed fixtures and tungsten lamps, battery, and battery charger, suitable for 120V or 277V AC power supply as indicated on the Drawings.
  - 2. Battery shall be sealed, maintenance-free, lead-calcium recombination type, 10-year life expectancy. Battery shall have 1-1/2 hour minimum capacity at rated wattage to 87-1/2% of rated DC voltage from a fully charged state. Shall carry a five-year pro-rata warranty.
  - 3. Battery charger shall be solid-state, voltage regulated. Charge circuit shall react to the condition of the battery and alter the rate of charge in order to maintain peak battery capacity and maximum battery life.
  - 4. A solid-state overload monitoring device in the DC circuit shall disconnect the lamp load from the battery should excessive wattage demands be made, and automatically reset when the overload or short circuit is removed.
  - 5. A brownout circuit shall monitor the flow of AC current to the unit and activate the emergency lighting system when a predetermined reduction of AC power occurs.
  - 6. The unit shall incorporate a solid-state switching system, not relays. The switching circuit shall detect a loss of AC voltage and automatically energize the DC lamps. Upon restoration of the AC power, the emergency lamps shall switch off and the charger shall automatically recharge the battery.
  - 7. When the battery's terminal voltage falls below 80% of the rated voltage, the low voltage circuitry shall disconnect the lighting load. The disconnect shall remain in effect until normal utility power is restored, preventing deep battery discharge.

- B. Not used.

## 2.8 OUTDOOR FIXTURES

- A. Outdoor fixtures shall be weatherproof, heavy duty types designed for efficient light utilization, adequate dissipation of lamp and ballast heat and safe cleaning and relamping. Ballasts shall be incorporated in the luminaire housings unless otherwise noted. Luminaires shall be sealed unless charcoal filters are provided. Lenses shall be heat and impact resistant, tempered glass. Lens gasket shall be heat and weather resistant. Materials shall be rustproof. Latches and fittings shall be nonferrous metal or stainless steel.
- B. Reflectors on HID fixtures shall be secured with lock washers.
- C. Set screws on HID fixture reflectors shall be factory furnished in size and quantity to assure that reflector does not vibrate when touched or struck.

## 2.9 POLES AND STANDARDS

- A. Lighting standards, assemblies, and pole bases shall be designed and constructed to withstand a steady wind velocity of 100 miles per hour without permanent distortion or displacement. Where unusual soil or base installation conditions occur, the Contractor shall provide adequate reinforcement under the guidance of the Architect to assure the specified strength for 100-mile-per-hour wind. Generally poles/bases shall be suitable for installation in earth having an allowable bearing of 1800 pounds per square foot.

## 2.10 FIXTURES

- A. See Drawings for Lighting Fixture List/Schedule.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Lamps of the proper type, wattage, and voltage rating shall be delivered to the project in the original cartons and installed in the fixtures just prior to the completion of the project. Provide lamp type as recommended by the fixture manufacturer.
- B. Fixtures shall be left clean at the time of acceptance of the work with every lamp in operation. If fixtures are deemed dirty by the Architect at completion of the project, the Contractor shall clean them.
- C. Fixtures shall be carefully aligned, leveled in straight lines, and located as shown on the Architectural reflected ceiling plan. The final decision as to adequacy of support and alignment shall be made by the Architect. The fixtures shall be supported and fastened to the ceiling system.
- D. Verify all ceiling conditions and provide all lighting fixtures complete with factory furnished stems, balls, aligners, and canopies as required for a complete installation.



- E. Recessed fluorescent troffers installed in suspended T-bar ceiling shall be independently supported on two opposite corners by #12 gauge steel wire attached to structure, per UBC Standard #47-18.
- F. Surface mounted light fixtures shall be securely fastened to the building surface via factory-created holes in the fixtures. Attachment of fixture merely to recessed outlet box is not sufficient.
- G. Where two switches are shown dedicated to an office, room, or area, provide two-level lighting.
- H. Lighting fixtures in any single enclosed room shall be connected using a common (one) circuit, except in cases where the loading requires a second circuit.
- I. Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.
- J. Standards shall be plumb with arms aligned and square. Arms shall be perpendicular to the parking axis unless specifically shown otherwise.
- K. Standards shall be in line such that sighting along straight lines of standards will show no standard out of line with the others. The Contractor is cautioned that some curbs or roadway edges may not be straight and, therefore, should not be used for alignment.
- L. The Contractor shall erect the luminaires and pole assemblies complete on locations called out on the Drawings.
- M. The poles shall be installed with leveling nuts (galvanized). The space between the bottom of the pole base flange and the top of the footing shall be grouted to present a finished appearance with a 1/2" drain hole.

END OF SECTION

## SECTION 311000 - SITE CLEARING

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
- E. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.
- F. Refer to Geotechnical Report in section 00 10 20 for additional & specific requirements.

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance.
- B. Protect site improvements to remain from damage. Restore damaged improvements to condition existing before start of site clearing.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated.
- D. Protect remaining trees and shrubs from damage and maintain vegetation. Employ a licensed arborist to repair tree and shrub damage. Restore damaged vegetation. Replace damaged trees that cannot be restored to full growth, as determined by arborist.
- E. Do not store materials or equipment or permit excavation within drip line of remaining trees.
- F. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, as required..

- G. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
  - 2. Obtain Oregon DEQ 1200 C erosion & sediment control permit and implement permit requirements. Maintain erosion & sediment control features until permanent measures are established.

### 3.2 SITE CLEARING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
- B. Strip topsoil. Stockpile topsoil that will be reused in the Work.
  - 1. Stockpile surplus topsoil to allow for respreading deeper topsoil.
- C. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- D. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Neatly saw-cut length of existing pavement to remain before removing existing pavement.
- E. In areas not to be further excavated, fill depressions resulting from site clearing. Place and compact satisfactory soil materials in **6-inch**- thick layers to density of surrounding original ground. See Geotechnical report for further information
- F. Dispose of waste materials, including trash, debris, and excess topsoil, off Owner's property. Burning waste materials on-site is not permitted.
  - 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 311000

## SECTION 312000 - EARTH MOVING

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Unit prices for rock excavation are included in Division 01 Section "Unit Prices."
- B. Unauthorized excavation consists of excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- C. Do not interrupt existing utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
- D. Refer to Geotechnical Report in section 00 10 20 for additional & specific requirements.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Satisfactory Soil: Per Geotechnical Report
- B. Unsatisfactory Soil: Per Geotechnical Report
- C. Backfill and Fill: Per Geotechnical Report. Terms, descriptions, and gradations of granular soil materials in paragraphs below are examples only. Revise to comply with local practices and to suit Project. For example, granular materials may be referenced by state or local highway designations rather than by ASTM classifications.
- D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a **1-1/2-inch** sieve and not more than 12 percent passing a **No. 200** sieve.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a **1-inch** sieve and not more than 8 percent passing a **No. 200** sieve.
- F. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a **1-1/2-inch** sieve and 0 to 5 percent passing a **No. 8** sieve. Open graded.
- G. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Re-use existing site material as practicle.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
- D. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- E. Explosives: Do not use explosives.
- F. Excavate to subgrade elevations regardless of character of materials and obstructions encountered.
- G. Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Engineer. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents.
- H. Excavate for structures, building slabs, pavements, and walkways. Trim subgrades to required lines and grades.
- I. Utility Trenches: Excavate trenches to indicated slopes, lines, depths, and invert elevations. Maintain **12 inches** of working clearance on each side of pipe or conduit.
  - 1. Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
  - 2. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than **1 inch**, to a height of **12 inches** over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.
- J. Plow strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal to receive fill.
- K. Proof-roll subgrade with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than **15 tons** to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- L. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface, pulverize, moisture-condition or aerate soil, and recompact.
- M. Place backfill and fill in layers not more than **8 inches** in loose depth at optimum moisture content. Compact each layer under structures, building slabs, pavements, and walkways to per Geotechnical Report

- N. Grade areas to a smooth surface to cross sections, lines, and elevations indicated. Grade lawns, walkways, and unpaved subgrades to tolerances of plus or minus 1 inch and pavements and areas within building lines to plus or minus 1/2 inch.
- O. Under pavements and walkways, place subbase course material on prepared subgrades and compact at optimum moisture content to required grades, lines, cross sections, and thicknesses.
- P. Under slabs-on-grade, place drainage course on prepared subgrade and compact to required cross section and thickness.
- Q. Allow testing agency to inspect and test each subgrade and each fill or backfill layer and verify compliance with requirements.
- R. Remove surplus satisfactory soil to approved location on site, on south side of stormwater berm
- S. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

## SECTION 321313 - CONCRETE PAVING

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and design mixtures for concrete.
- B. Comply with **ACI 301** unless otherwise indicated.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Welded Wire Reinforcement: ASTM A 185, flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60**, deformed.
- C. Portland Cement: ASTM C 150, Type I or II, gray. Supplement with the following:
  - 1. Fly Ash: ASTM C 618, Type C or F.
  - 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- D. Normal-Weight Aggregates: ASTM C 33,, uniformly graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: **1-1/2 inches** nominal.
- E. Air-Entraining Admixture: ASTM C 260.
- F. Chemical Admixtures: ASTM C 494. Calcium chloride shall not be used.
- G. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures.
- H. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.
- I. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery.
- J. Siloxane Sealer: 6% to 12% Siloxane sealer. Masco 6WB, 12WB, or approved equal
- K. Cast in place ADA matts. Yellow w/domed texture. See drawings
- L. Pavement-Marking Paint: MPI #97 latex traffic marking paint.
  - 1. Color:

- a. White
  - 1) Parking stripes
  - 2) ADA stripes
- b. Yellow.
  - 1) Curbs in no parking areas

## 2.2 CONCRETE MIXTURES

- A. Proportion normal-weight concrete mixes to provide the following properties:
  - 1. Compressive Strength (28 Days): **4500 psi**.
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
  - 3. Slump Limit: As required. Do not add job-site water. Adjust slump w/approved water reducers and plastisizers.
  - 4. Air Content: 6 percent plus or minus 1.5 percent.
  - 5. Synthetic Fiber: Do not Use

## PART 3 - EXECUTION

### 3.1 PAVING

- A. Cast exterior concrete between April 1 and September 15.
- B. Exterior concrete requires special inspection. Contractor to coordinate with owner's testing and inspection agency.
- C. Accurately position and support reinforcement, and secure against displacement.
- D. Locate and install contraction, construction, isolation, and expansion joints as indicated or required.
- E. Place concrete in a continuous operation within planned joints or sections. Do not add water to adjust slump.
- F. Float surfaces to true planes within a tolerance of **1/4 inch in 10 feet** and medium-to-fine-textured broom finish.
- G. Tool edges and joints to a radius of **3/8 inch**.
- H. Stamped Detectable Warnings: Install stamped detectable warnings according to stamp-mat manufacturer's written instructions. Accurately align and place stamp mats in sequence. Press mats into concrete to produce imprint pattern on concrete surface, then remove stamp mats.
- I. Begin curing after finishing concrete. Keep concrete continuously moist for at least seven days. Do not use form release or curing compounds unless approved by EOR as they will interfere with the application of the siloxane sealer
- J. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.



- K. Apply traffic paint with mechanical equipment to a minimum wet film thickness of 15 mils.
- L. Owner will engage a qualified testing agency to perform tests and inspections.
- M. Remove and replace concrete paving that is broken, damaged, or defective. Remove work in complete sections from joint to joint unless otherwise approved by EOR.
- N. Protect concrete paving from damage. Exclude traffic from paving for at least 7 days or until compressive strength exceeds 3,000 psi.
- O. After 28 days apply siloxane sealer to all exposed surfaces per manufacture's recommendations.

END OF SECTION 321313