

**PROJECT MANUAL FOR:**

**ARCHITECTURE & ALLIED ARTS REMODEL**

**UNIVERSITY OF OREGON**

**EUGENE, OREGON**

**JUNE 3<sup>rd</sup>, 2014**



**NIR PEARLSON**  
ARCHITECT, INC.



**PROJECT MANUAL FOR:**

**ARCHITECTURE & ALLIED ARTS REMODEL**

1190 Franklin Boulevard  
University of Oregon  
Eugene, Oregon 97403

**Owner:** Project no. UO-410-P-13-16

Oregon State Board of Higher Education  
University of Oregon  
Division of Facilities Services  
1276 Franklin Boulevard  
Eugene, Oregon 97403  
Fax (541) 346-2299  
Project Manager: Glen MacDonald (541) 346-2281



**Architect:** Project no. 1407

Nir Pearlson Architect, Inc.  
1460 E21st Avenue  
Eugene, OR 97403  
Tel (541) 345-5547  
Fax (541) 345-5527

**Structural Engineer:**

Johnson & Broderick Engineering  
325 W 13th Avenue  
Eugene Oregon 97401  
Tel (541) 338-9488  
Fax (541) 338-9483

**Mechanical Engineer:**

Fresh Aire Engineering, LLC  
8245 NW Chaparral Drive  
Corvallis, OR 97330  
Tel (541) 738-8704

**Electrical Engineer:**

Paradigm Engineering  
85193 Apple Tree Drive  
Eugene OR 97405  
Tel (541) 345-7813

**Date:**

June 3<sup>rd</sup>, 2014





**UNIVERSITY OF OREGON**

Lawrence Hall

Architecture & Allied Arts Remodel

**TABLE OF CONTENTS**

**BIDDING AND CONTRACTING REQUIREMENTS**

**Division 00 -- Procurement and Contracting Requirements**

- 00 01 01 - Project Title Page
- 00 01 10 - Table of Contents
- 00 01 15 - List of Drawings
- Form B-1 - Notice of Retainer Contract Opportunity
- Form B-2 - Instructions to Bidders
- Form B-3 - Supplemental Instructions to Bidders
- Form B-5 - Bid Form
- Form B-7 - UO Supplementary General Conditions
- Form B-8 - General Conditions 7/1/12
- Form B-9 - Performance Bond
- Form B-10 - Payment Bond
- OUS - Retainer Contract Supplement Form
- OUS - Retainer Contract Supplement Amendment Form
- BOLI - BOLI 1/1/14, as Amended 4/1/14
- OUS - MWESB Reporting Form

**SPECIFICATIONS**

**Division 01 -- General Requirements**

- 01 10 00 - Summary
- 01 20 00 - Price and Payment Procedures
- 01 30 00 - Administrative Requirements
- 01 32 16 - Construction Progress Schedule
- 01 40 00 - Quality Requirements
- 01 50 00 - Temporary Facilities and Controls
- 01 60 00 - Product Requirements
- 01 60 01 - Substitution Request Form
- 01 70 00 - Execution and Closeout Requirements
- 01 78 00 - Closeout Submittals

**Division 02 -- Existing Conditions**

- 02 41 00 - Demolition

**Division 03 -- Concrete**

- 03 20 00 - Concrete Reinforcing
- 03 30 00 - Cast-in-Place Concrete

**Division 05 -- Metals**

- 05 12 00 - Structural Steel Framing
- 05 50 00 - Metal Fabrications

**Division 06 --Wood, Plastics, and Composites**

- 06 10 00 - Rough Carpentry
- 06 18 10 - Glued-Laminated Structural Units
- 06 20 00 - Finish Carpentry
- 06 41 00 - Architectural Wood Casework

**Division 07 -- Thermal and Moisture Protection**

- 07 21 20 - Board and Batt Insulation
- 07 53 00 - Elastomeric Membrane Roofing
- 07 62 00 - Sheet Metal Flashing and Trim
- 07 92 00 - Joint Sealants

**Division 08 -- Openings**

- 08 14 00 - Wood Doors
- 08 31 00 - Access Doors and Frames
- 08 52 00 - Wood Windows
- 08 62 00 - Unit Skylights
- 08 71 00 - Door Hardware
- 08 72 00 - Thresholds
- 08 80 00 - Glazing

**Division 09 -- Finishes**

- 09 21 16 - Gypsum Board Assemblies
- 09 22 16 - Non Structural Metal Framing
- 09 51 10 - Acoustical Panel Ceilings
- 09 65 00 - Resilient Flooring
- 09 68 13 - Tile Carpeting
- 09 90 00 - Painting and Coating

**Division 15 -- Heating, Ventilating, and Air-Conditioning (HVAC)**

- 15 05 00 - Basic Mechanical Requirements
- 15 06 00 - Pipe and Pipe Fittings - General
- 15 08 00 - Copper Tubing Systems
- 15 14 00 - Piping Supports and Anchors

- 15 29 00 - Ductwork Insulation
- 15 73 10 - Packaged Rooftop Heat Pump Units
- 15 81 10 - HVAC Ductwork and Accessories
- 15 85 10 - Diffusers, Grilles and Registers
- 15 95 20 - Air Systems Testing

**Division 22 -- Plumbing**

- 22 42 16 - Commercial Lavatories and Sinks

**Division 26 -- Electrical**

- 26 01 10 - General Electrical Provisions
- 26 01 60 - Minor Electrical Demolition
- 26 05 19 - Wire and Cable
- 26 05 29 - Supporting Devices
- 26 05 30 - Conduit
- 26 05 31 - Surface Raceways
- 26 05 32 - Outlet, Pull, and Junction Boxes
- 26 05 53 - Electrical Identification
- 26 09 23 - Lighting Control Equipment
- 26 24 16 - Panelboards
- 26 27 26 - Wiring Devices
- 26 50 00 - Light Fixtures

**Division 27 -- Communications**

- 27 30 00 - Communication Raceway Systems

**Division 27 -- Electronic Safety and Security**

- 28 23 30 - Fire Alarm System

**PROJECT ATTACHMENTS**

**Structural Engineering**

Structural Calculations

**Mechanical Engineering**

Ventilation Calculations

**Energy Compliance**

Com-Check Mechanical Energy Compliance Certificate

Com-Check Interior Lighting Energy Compliance Certificate



**DRAWINGS****General**

G000 Cover Sheet; Project Info; Site Plan  
G001 Egress Diagrams; Code Analysis

**Structural**

S100 Structural Plans  
S200 Structural Sections; Details

**Architectural**

A100 Demolition Plans  
A110 North Wing Floor Plan; Door & Window Schedules  
A111 North Wing Reflected Ceiling Plan; Roof Plan  
A120 West Wing Floor Plan; Reflected Ceiling Plan  
A200 Building Sections  
A211 North Wing Details  
A410 Finish Plans; Finish Schedule  
A411 North Wing Interior Elevations  
A412 North Wing Interior Elevations; Casework Details

**Mechanical**

M100 HVAC Partial Floor Plans

**Electrical**

E100 Legend, One Line Diagrams; Feeder Plan Diagrams  
E101 Panel Schedules  
E110 North Wing Elec. Demolition Plan  
E111 North Wing Power/Data Plan  
E112 North Wing Lighting Plan; Lighting Schedule  
E120 West Wing Elec. Demolition Plan; Power/Data Plan  
E121 West Wing Elec. Roof Plan; Lighting Plan; Lighting Schedule



# OREGON UNIVERSITY SYSTEM

## NOTICE OF RETAINER CONTRACT OPPORTUNITY

**THIS OPPORTUNITY IS ONLY AVAILABLE TO CONTRACTORS WITH A CURRENT OREGON UNIVERSITY SYSTEM (OUS) RETAINER CONTRACT FOR CONSTRUCTION RELATED SERVICES.**

The State of Oregon, acting by and through the State Board of Higher Education on behalf of the University of Oregon (“Owner”) is accepting sealed bids for a public improvement project at the University of Oregon Campus Planning, Design & Construction, 1295 Franklin Boulevard, Eugene, OR 97403 (formerly called Capital Construction) front desk until 4:00 **PM**, Pacific Time, June 18, 2014 for the Architecture & Allied Arts Remodel project located on the campus of the University of Oregon, in Eugene, Oregon (“Project”). The Project includes **Architectural, Mechanical and Electrical work common to Tenant Improvements.**

A **mandatory pre-bid conference and examination of the site and conditions** will be conducted at 2 PM on June 11, 2014. Bidders shall meet with Owner’s Representative at the lobby of Lawrence Hall, 1190 Franklin Boulevard (Lobby best reached through the north end of University Street off of 13<sup>th</sup> Avenue) for that purpose. Attendance will be documented through a sign-in sheet prepared by the Owner’s Representative. Prime bidders who arrive more than 5 minutes after start of time of the meeting (as stated in the solicitation and by the Owner’s Representative’s watch) or after the discussion portion of the meeting (whichever comes first) shall not be permitted to sign in and will not be permitted to submit a bid on the Project.

Bids will be received on a lump-sum basis for all of the work. **Bid packets may be obtained on the OUS Bid and Business Opportunities website (<http://secure.ous.edu/bid/>).**

All bidders must comply with requirements of the prevailing wage law in ORS 279C.800 through ORS 279C.870. All bidders must be registered with the Construction Contractor’s Board at the time of bid submission. No bid will be considered unless fully completed in the manner provided in the “Instructions to Bidders” upon the Bid Form provided and accompanied by Bid Security. OUS encourages bids from Minority, Women, and Emerging Small Businesses.

OREGON STATE BOARD OF HIGHER EDUCATION

By: Jamie Moffitt, Vice President for Finance and Administration





**OREGON UNIVERSITY SYSTEM**

**STANDARD PUBLIC IMPROVEMENT CONTRACT**

**PAYMENT BOND**

Bond No. \_\_\_\_\_  
Solicitation \_\_\_\_\_  
Project Name \_\_\_\_\_

\_\_\_\_\_ (Surety #1)                      Bond Amount No. 1:                      \$ \_\_\_\_\_  
\_\_\_\_\_ (Surety #2)\*                      Bond Amount No. 2:\*                      \$ \_\_\_\_\_  
*\* If using multiple sureties*                      Total Penal Sum of Bond:                      \$ \_\_\_\_\_

We, \_\_\_\_\_, as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto the State of Oregon, acting by and through the State Board of Higher education, on behalf of the Oregon University System (OUS), the sum of (Total Penal Sum of Bond) \_\_\_\_\_ (Provided, that we the Sureties bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety), and

WHEREAS, the Principal has entered into a contract with the OUS, the plans, specifications, terms and conditions of which are contained in above-referenced Solicitation;

WHEREAS, the terms and conditions of the contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of contract prices, are made a part of this Payment Bond by reference, whether or not attached to the contract (all hereafter called "Contract"); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and schedule of contract prices which are set forth in the Contract and any attachments, and all authorized modifications of the Contract which increase the amount of the work, or the cost of the Contract, or constitute authorized extensions of time for performance of the Contract, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal shall faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, and shall well and truly and fully do and perform all matters and things by it undertaken to be performed under said Contract and any duly authorized modifications that are made, upon the terms set forth therein, and within the time prescribed therein, or as extended therein as provided in the Contract, with or without notice to the Sureties, and shall indemnify and save harmless the OUS and \_\_\_\_\_ (name of institution and any other Owner agency), and members thereof, its officers, employees and agents, against any claim for direct or indirect damages of every kind and description that shall be suffered or

claimed to be suffered in connection with or arising out of the performance of the Contract by the Contractor or its subcontractors, and shall promptly pay all persons supplying labor, materials or both to the Principal or its subcontractors for prosecution of the work provided in the Contract; and shall promptly pay all contributions due the State Industrial Accident Fund and the State Unemployment Compensation Fund from the Principal or its subcontractors in connection with the performance of the Contract; and shall pay over to the Oregon Department of Revenue all sums required to be deducted and retained from the wages of employees of the Principal and its subcontractors pursuant to ORS 316.167, and shall permit no lien nor claim to be filed or prosecuted against the State on account of any labor or materials furnished; and shall do all things required of the Principal by the laws of this State, then this obligation shall be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond, nor shall the State of Oregon, or the OUS be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapters 279C and 351, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES:

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

**PRINCIPAL:** \_\_\_\_\_

By \_\_\_\_\_  
Signature

\_\_\_\_\_  
Official Capacity

Attest: \_\_\_\_\_  
Corporation Secretary

**SURETY:** \_\_\_\_\_

*[Add signatures for each if using multiple bonds]*

**BY ATTORNEY-IN-FACT:**

*[Power-of-Attorney must accompany each bond]*

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
City State Zip

\_\_\_\_\_  
Phone Fax

**OREGON UNIVERSITY SYSTEM**  
**STANDARD RETAINER CONTRACT**  
**INSTRUCTIONS TO BIDDERS**

Table of Contents

<u>Article</u>	<u>Title</u>
1.	Definitions
2.	Scope of Work
3.	Examination of Site and Conditions
4.	Substitute Materials Approval Process
5.	Interpretation of Project Manual
6.	Execution of the Bid Form
7.	Prohibition of Alterations to Bid
8.	Submission of Bid
9.	Bid Closing and Opening of Bids
10.	Acceptance or Rejection of Bids by Owner
11.	Withdrawal of Bid
12.	Execution of Contract, Agreement, Performance Bond and Payment Bond
13.	Recyclable Products

## **INSTRUCTIONS TO BIDDERS**

Oregon Administrative Rules (“OAR”) Chapter 580, Divisions 61 and 63 govern this OUS procurement process.

### **Article 1. Definitions**

**1.1.** Capitalized words used herein but not defined shall have the meaning set forth in the OUS Retainer General Conditions and OAR 580-061-0010. The following terms used herein shall have the meaning set forth below:

“**Bid Form**”- refers to OUS Contract Form B-5 provided by Owner to be completed by Bidder.

“**Project Manual**”- The Project Manual includes, but is not necessarily limited to the following: the Advertisement for Bids or Notice of Contracting Opportunity, these Instructions to Bidders, Supplemental Instructions to Bidders, Bid Form, OUS Retainer Contract General Conditions, Supplemental General Conditions (if any), Sample Retainer Contract Supplement, Performance Bond, Payment Bond, and the Plans and Specifications.

### **Article 2. Scope of Work**

**2.1** The Work contemplated in this document shall be for the Owner in connection with the Project described in the Project Manual.

### **Article 3. Examination of Site and Conditions**

**3.1** Before making a Bid, the Bidder shall examine the Work site to ascertain its physical condition. The Bidder shall be responsible for being fully informed as to the quality, quantity and sources of supply of the materials listed on the Project Manual. Failure to comply with this Section will not release Contractor from entering into the Contract nor excuse Contractor from performing the Work in strict accordance with the terms of the Contract Documents.

**3.2** The Owner will not be responsible for any loss or unanticipated costs which may arise as a result of Contractor's failure to be fully informed in advance with regard to all conditions pertaining to the Work and the character of the Work required.

**3.3.** No statement made by any officer, agent, or employee of the Owner in relation to the physical conditions pertaining to the Work site or quality, quantity, and supply of materials will be binding on the Owner, unless included in writing in the Project Manual or an Addendum.

### **Article 4. Substitute Materials Approval Process**

**4.1** Prior to submitting a Bid including a Substitution, the Bidder must first seek approval of the Substitution from the Architect (or Engineer, as appropriate hereafter) by submitting a written request for approval at least three calendar days prior to the Closing Date and Time. The Bidder submitting the request shall be responsible for its timely delivery.

**4.2** Substitution approval requests shall be accompanied by samples, records of performance, certified copies of tests by impartial and recognized laboratories, and such other information as the Architect may request.

**4.3** Within a reasonable time after receiving such a request the Owner (or Architect if so designated) will consider

whether the Substitution sought by Bidder is of equal value, utility, as the designated product in the Project Manual. If the requested Substitution is approved an Addendum to the Project Manual shall be issued. A copy of each Addendum will be posted on the OUS Bid and Business Opportunities website (<http://secure.ous.edu/bid>) and shall become a part of the Project Manual.

**4.4** When the Architect approves a Substitution by Addendum, it is with the understanding that the Contractor guarantees the substituted article or material to be equal or better than the one specified.

## **Article 5. Interpretation of Project Manual**

**5.1** A Bidder in doubt as to the meaning of any part of the Project Manual may submit a written request for an interpretation to the Architect at any time prior to three calendar days prior to the Closing Date and Time.

**5.2** Any interpretation of the Project Manual will be made only by a duly issued Addendum. The Owner will not be responsible for any other explanation or interpretation of the Project Manual nor for any other approval of a particular manufacturer's process or item.

**5.3** To establish a basis of quality, certain processes, types of machinery and equipment or kinds of materials may be specified in the Project Manual either by description of process or by designating a manufacturer by name and referring to a brand or product designation or by specifying a kind of material. Whenever a process is designated or a manufacturer named, brand or item designation given, or whenever a process or material covered by patent is designated or described, it shall be understood that the words "or approved equal" follow such name, designation or description, whether they do so or not.

## **Article 6. Execution of the Bid Form**

**6.1** The Bid Form relates to Bids on a specific Project Manual. Only the amounts and information asked for on the Bid Form furnished by the Owner will be considered as the Bid. Each Bidder shall Bid upon the Work exactly as set forth in the Bid Form. The Bidder shall include in the Bid a sum to cover the cost of all items contemplated by the Project Manual. Bids that fail to address alternates set forth on the Bid Form may be considered non-responsive.

**6.2** Each Bid Form must: 1) Be completed in accordance with these instructions; 2) Include the appropriate signatures as noted on the Bid Form; 3) Include numbers pertaining to base Bids stated both in writing and in figures; and 4) Include the Bidder's typed or clearly printed address.

**6.3** When Bidding on an alternate for which there is no charge, the Bidder shall write the words "No Charge" in the space provided on the Bid Form. If one or more alternates is shown on the Bid Form, the Bidder shall indicate whether each is "add" or "deduct."

## **Article 7. Prohibition of Alterations to Bid**

**7.1** Bids which are incomplete, or contain ambiguities or conditions not provided for in the Bid Form, may be rejected.

## **Article 8. Submission of Bid**

**8.1** Each Bid shall be sealed in an envelope, properly addressed to the appropriate project representative of the Owner, showing on the outside of the envelope the name of the Bidder and the name of the project. Bids will be received at the time and place stated in the Advertisement for Bids.

## **Article 9. Bid Closing and Opening of Bids**

**9.1** All Bids must be received by the Owner before the Closing Date and Time. Any Bids received after the Closing Date and Time will be rejected and returned to the Bidder unopened.

## **Article 10. Acceptance or Rejection of Bids by Owner**

**10.1** Unless all Bids are rejected, the Owner will award the Contract based on the lowest responsive Bid from a responsible Bidder. If that Bidder does not execute the Contract, the Contract will be awarded to the next lowest responsible Bidder or Bidders in succession.

**10.2** The procedures for Contract awards shall be in compliance with the provisions of OARs adopted by the Owner.

**10.3** The Owner reserves the right to reject all Bids and to waive minor informalities.

**10.4** In determining the lowest Bidder, the Owner reserves the right to take into consideration any or all authorized base Bids as well as alternates or combinations indicated in the Bid Form.

**10.5** If Owner has not accepted a Bid within 30 calendar days after the opening of the Bids, each of the three lowest Bidders may withdraw the Bid submitted.

## **Article 11. Withdrawal of Bid**

**11.1** At any time prior to the Closing Date and Time a Bidder may withdraw its Bid. This will not preclude the submission of another Bid by such Bidder prior to the Closing Date and Time.

**11.2** After the Closing Date and Time, no Bidder will be permitted to withdraw its Bid within the time period specified in Article 10 for award and execution, except as provided for in that Article.

## **Article 12. Execution of Contract, Agreement, Performance Bond and Payment Bond**

**12.1** The Owner will provide the successful Bidder with Contract Documents within 10 calendar days after the award of the Contract. The Bidder shall be required to execute the Contract as provided, including a Performance Bond and a Payment Bond from a surety company licensed to do surety business in the State of Oregon, within 20 calendar days after the award of the Contract. The Contract Documents shall be delivered to the Owner in the manner stated in the Notice of Award.

## **Article 13. Recyclable Products**

**13.1** Contractors must use recyclable products to the maximum extent economically feasible in the performance of the Contract.

**OREGON UNIVERSITY SYSTEM**  
**STANDARD RETAINER CONTRACT**  
**SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

**Project Name: Architecture & Allied Arts Remodel**

**The following modify the Oregon University System “Instructions to Bidders, Form B-2” for this procurement. Where a portion of the Instructions to Bidders has been modified by these Supplemental Instructions to Bidders, the unaltered portions shall remain in effect.**





**OREGON UNIVERSITY SYSTEM  
STANDARD RETAINER CONTRACT  
BID FORM**

OUS CAMPUS: UNIVERSITY OF OREGON

PROJECT: Architecture & Allied Arts Remodel

BID CLOSING DATE: June 18, 2014

FROM: \_\_\_\_\_  
*Name of Contractor*

TO: The State of Oregon, acting by and through the Oregon State Board of Higher Education,  
on behalf of the University of Oregon ("Owner")  
*(campus or office name and address)*

Capital Construction  
1295 Franklin Boulevard  
1276 University of Oregon  
Eugene, OR 97403-1276

1. The Undersigned *(check one of the following and insert information as requested)*:

\_\_\_ a. An individual doing business under an assumed name registered under the laws of  
the State of \_\_\_\_\_; or

\_\_\_ b. A partnership registered under the laws of the State of \_\_\_\_\_;  
or

\_\_\_ c. A corporation organized under the laws of the State of \_\_\_\_\_; or

\_\_\_ d. A limited liability corporation/company organized under the laws  
of the State of \_\_\_\_\_;

hereby proposes to furnish all material and labor and perform all Work hereinafter  
indicated for the above project in strict accordance with the Contract Documents for the  
Basic Bid as follows:

\_\_\_\_\_ Dollars (\$\_\_\_\_\_)

and the Undersigned agrees to be bound by each of the following documents:

- Notice of Retainer Contract Opportunity
- Instructions to Bidders
- Supplemental Instructions to Bidders, if any
- OUS Retainer Contract General Conditions

- UO Supplemental Retainer Contract General Conditions
- Sample Retainer Contract Supplement
- Performance Bond and Payment Bond
- Plans and Specifications
- Prevailing Wage Rates
- Payroll and Certified Statement Form  
(found at [http://egov.oregon.gov/BOLI/WHD/PWR/W\\_PWR\\_Forms.shtml](http://egov.oregon.gov/BOLI/WHD/PWR/W_PWR_Forms.shtml))

- ADDENDA numbered \_\_\_\_ through \_\_\_\_, inclusive (*fill in blanks*).

2. The work shall be completed within the time stipulated and specified in Division 1, Section 01 10 00-Summary, of the Specifications.

3. The Undersigned certifies that: (1) This Bid has been arrived at independently and is being submitted without collusion with and without any agreement, understanding, or planned common course of action with any other vendor of materials, supplies, equipment or services described in the invitation to bid designed to limit independent bidding or competition; and (2) The contents of the Bid have not been communicated by the Undersigned or its employees or agents to any person not an employee or agent of the Undersigned and will not be communicated to such person prior to the official opening of the Bid.

4. The undersigned **HAS, HAS NOT** (*circle applicable status*) paid unemployment or income taxes in Oregon within the past 12 months and **HAS, HAS NOT** (*circle applicable status*) a business address in Oregon.

5. The Undersigned agrees, if awarded a contract, to comply with the provisions of ORS 279C.800 through 279C.870 pertaining to the payment of the prevailing rates of wage.

6. Contractor's CCB registration number is \_\_\_\_\_. As a condition to submitting a bid, a Contractor must be registered with the Oregon Construction Contractors Board in accordance with ORS 701.035 to 701.055, and disclose the registration number. Failure to register and disclose the number will render the bid unresponsive and it will be rejected, unless contrary to federal law.

7. The successful Bidder hereby certifies that all subcontractors who will perform construction work as described in ORS 701.005(2) were registered with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 at the time the subcontractor(s) made a bid to work under the Contract.

8. The successful Bidder hereby certifies that, in compliance with the Worker's Compensation Law of the State of Oregon, its Worker's Compensation Insurance provider is \_\_\_\_\_, Policy No. \_\_\_\_\_, and that Contractor shall submit Certificates of Insurance as required.

9. Contractor's Project Manager for this project is: \_\_\_\_\_,  
Office Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_.

10. The Undersigned certifies that it has not discriminated against minority, women, or

emerging small businesses in obtaining any subcontracts for this project.

11. The Undersigned agrees, if awarded the Contract, to execute and deliver to Owner, within twenty (20) calendar days after receiving the Contract Documents, an Agreement Form and a satisfactory Performance Bond and Payment Bond, each in an amount equal to one hundred (100) percent of the Contract sum, using forms provided by the Owner. The surety requested to issue the Performance Bond and Payment Bond will be:

\_\_\_\_\_.  
*(name of surety company - not insurance agency)*

The Undersigned hereby authorizes said surety company to disclose any information to the Owner concerning the Undersigned's ability to supply a Performance Bond and Payment Bond each in the amount of the Contract.

12. In determining the lowest Bidder, the Owner reserves the right to take into consideration any or all authorized base Bids as well as alternates or combinations indicated in the Bid Form.

By signature below, Contractor agrees to be bound by this Bid.

NAME OF FIRM \_\_\_\_\_

ADDRESS \_\_\_\_\_

FEDERAL TAX ID \_\_\_\_\_

TELEPHONE NO \_\_\_\_\_

FAX NO \_\_\_\_\_

SIGNATURE 1) \_\_\_\_\_

Sole Individual

or 2) \_\_\_\_\_

Partner

or 3) \_\_\_\_\_

Authorized Officer of Corporation

(SEAL)

\_\_\_\_\_  
Attested: Secretary of Corporation

*Payment information will be reported to the IRS under the name and taxpayer ID # provided above. Information not matching IRS records could subject Contractor to 31 percent backup withholding.*

**\*\*\*\*\* END OF BID \*\*\*\*\***



**OREGON UNIVERSITY SYSTEM**

**RETAINER SUPPLEMENTAL GENERAL CONDITIONS**

**To The**

**GENERAL CONDITIONS  
FOR RETAINER CONTRACTS**

**Supplement No. \_\_\_\_\_  
Project Name \_\_\_\_\_**

**The following modify the July 1, 2012 Oregon University System “General Conditions for Retainer Contracts (“OUS Retainer General Conditions”) for the above referenced Retainer Contract Supplement. Where a portion of the OUS Retainer General Conditions is modified by these Supplemental General Conditions, the unaltered portions shall remain in effect.**

Section A.1, Definition for “Overhead” is deleted and replaced with the following:

**OVERHEAD**, means those items which may be included in the Contractor's markup (general and administrative expense and profit) and that shall not be charged as Direct Cost of the Work or General Conditions, including without limitation such Overhead expenses as wages or salary of personnel primarily at the Contractor’s principle place of business, Contractor's office costs and supplies at Contractor’s principal place of business, and Commercial General Liability Insurance and Automobile Liability Insurance.

Section B.4 is hereby deleted and replaced with the following:

Contractor shall obtain and pay for all necessary permits, licenses and fees, except for those specifically excluded in the Retainer Supplemental General Conditions, for the construction of the Work, for temporary obstructions, enclosures, opening of streets for pipes, walls, utilities, environmental Work, etc., as required for the project. Contractor shall be responsible for all violations of the law, in connection with the construction or caused by obstructing streets, sidewalks or otherwise. Contractor shall give all requisite notices to public authorities. Notwithstanding the first sentence of this paragraph, Owner shall pay for the following: Plan check fees and permit fees required for the general building permit, systems development charges, and building department inspection fees. Notwithstanding the foregoing, however, Contractor shall obtain all permits, licenses and fees required for the construction of the Work.

Section K.2 is hereby deleted and replaced with the following:

As part of the Work, Contractor shall submit two completed operation and maintenance manuals ("O & M Manuals") for review by the Owner prior to submission of any pay request for more than 75% of the Work. Owner's receipt of the O & M Manuals shall be a condition precedent to any payment thereafter due. The O & M Manuals shall contain a complete set of all submittals, all product data as required by the specifications, training information, telephone list and contact information for all consultants, manufacturers, installer and suppliers, manufacturer's printed data, record and shop drawings, schematic diagrams of systems, appropriate equipment indices, warranties and bonds. The Owner shall review and return one O & M Manual for any modifications or adjustments required. Prior to submission of its final pay request, Contractor shall deliver two complete and approved sets of O & M Manuals in paper form and one complete and approved set in electronic form to the Owner and Owner's receipt of the O & M Manuals shall be a condition precedent to Owner's obligation to make final payment.

Section K.4 is hereby deleted and replaced with the following:

As part of the Work, and prior to submission of the final application for payment, the Contractor shall schedule with the Owner and provide training sessions for all equipment and systems as required by the Contract Documents. Contractor shall schedule training sessions at least two weeks in advance of the date of training to allow Owner to provide its personnel with adequate notice. The O & M Manual shall be used as a basis for training. In addition to any off-site training required by the Contract Documents, training shall include a formal session conducted at the Work site after the equipment and/or system is completely installed and operational in its normal operating environment.

# OREGON UNIVERSITY SYSTEM

## GENERAL CONDITIONS FOR RETAINER CONTRACTS

July 1, 2012

INSTRUCTIONS: The attached **Oregon University System General Conditions for Retainer Contracts ("OUS Retainer General Conditions")** apply to all designated retainer contracts. Changes to the OUS Retainer General Conditions (including any additions, deletions or substitutions) should only be made by attaching Retainer Supplemental General Conditions. The text of these OUS Retainer General Conditions should not otherwise be altered.

### TABLE OF SECTIONS

#### **SECTION A** **GENERAL PROVISIONS**

- A.1 DEFINITION OF TERMS
- A.2 SCOPE OF WORK
- A.3 INTERPRETATION OF CONTRACT DOCUMENTS
- A.4 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE
- A.5 INDEPENDENT CONTRACTOR STATUS
- A.6 RETIREMENT SYSTEM STATUS AND TAXES
- A.7 GOVERNMENT EMPLOYMENT STATUS

#### **SECTION B** **ADMINISTRATION OF THE CONTRACT**

- B.1 OWNER'S ADMINISTRATION OF THE CONTRACT
- B.2 CONTRACTOR'S MEANS AND METHODS
- B.3 MATERIALS AND WORKMANSHIP
- B.4 PERMITS
- B.5 COMPLIANCE WITH GOVERNMENT REGULATIONS
- B.6 SUPERINTENDENCE
- B.7 INSPECTION
- B.8 SEVERABILITY
- B.9 ACCESS TO RECORDS
- B.10 WAIVER
- B.11 SUBCONTRACTS AND ASSIGNMENT
- B.12 SUCCESSORS IN INTEREST
- B.13 OWNER'S RIGHT TO DO WORK
- B.14 OTHER CONTRACTS
- B.15 GOVERNING LAW
- B.16 LITIGATION
- B.17 ALLOWANCES
- B.18 SUBMITTALS, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- B.19 SUBSTITUTIONS
- B.20 USE OF PLANS AND SPECIFICATIONS
- B.21 FUNDS AVAILABLE AND AUTHORIZED
- B.22 NO THIRD PARTY BENEFICIARIES

#### **SECTION C** **WAGES AND LABOR**

- C.1 MINIMUM WAGES RATES ON PUBLIC WORKS
- C.2 PAYROLL CERTIFICATION AND FEE REQUIREMENTS, ADDITIONAL RETAINAGE
- C.3 PROMPT PAYMENT AND CONTRACT CONDITIONS
- C.4 PAYMENT FOR MEDICAL CARE
- C.5 HOURS OF LABOR

#### **SECTION D** **CHANGES IN THE WORK**

- D.1 CHANGES IN THE WORK
- D.2 DELAYS
- D.3 CLAIMS REVIEW PROCESS

**SECTION E**  
**PAYMENTS**

- E.1 SCHEDULE OF VALUES
- E.2 APPLICATIONS FOR PAYMENT
- E.3 PAYROLL CERTIFICATION REQUIREMENT
- E.4 DUAL PAYMENT SOURCES
- E.5 RETAINAGE
- E.6 FINAL PAYMENT

**SECTION F**  
**JOB SITE CONDITIONS**

- F.1 USE OF PREMISES
- F.2 PROTECTION OF WORKERS, PROPERTY, AND THE PUBLIC
- F.3 CUTTING AND PATCHING
- F.4 CLEANING UP
- F.5 ENVIRONMENTAL CONTAMINATION
- F.6 ENVIRONMENTAL CLEAN-UP
- F.7 FORCE MAJEURE

**SECTION G**  
**INDEMNITY, BONDING AND INSURANCE**

- G.1 RESPONSIBILITY FOR DAMAGES/INDEMNITY
- G.2 PERFORMANCE AND PAYMENT SECURITY, PUBLIC WORKS BOND
- G.3 INSURANCE

**SECTION H**  
**SCHEDULE OF WORK**

- H.1 CONTRACT PERIOD
- H.2 SCHEDULE
- H.3 PARTIAL OCCUPANCY OR USE

**SECTION I**  
**CORRECTION OF WORK**

- I.1 CORRECTIONS OF WORK BEFORE FINAL PAYMENT
- I.2 WARRANTY WORK

**SECTION J**  
**SUSPENSION AND/OR TERMINATION OF THE WORK**

- J.1 OWNER'S RIGHT TO SUSPEND THE WORK
- J.2 CONTRACTOR'S RESPONSIBILITIES
- J.3 COMPENSATION FOR SUSPENSION
- J.4 OWNER'S RIGHT TO TERMINATE CONTRACT
- J.5 TERMINATION FOR CONVENIENCE
- J.6 ACTION UPON TERMINATION

**SECTION K**  
**CONTRACT CLOSE-OUT**

- K.1 RECORD DOCUMENTS
- K.2 OPERATION AND MAINTENANCE MANUALS
- K.3 COMPLETION NOTICES
- K.4 TRAINING
- K.5 EXTRA MATERIALS
- K.6 ENVIRONMENTAL CLEAN-UP
- K.7 CERTIFICATE OF OCCUPANCY
- K.8 OTHER CONTRACTOR RESPONSIBILITIES
- K.9 SURVIVAL



**OREGON UNIVERSITY SYSTEM  
GENERAL CONDITIONS FOR RETAINER CONTRACTS  
("OUS Retainer General Conditions")**

**SECTION A  
GENERAL PROVISIONS**

**A.1 DEFINITION OF TERMS**

In the Contract Documents the following terms shall be as defined below:

**AMENDMENT**, means a writing which, when fully executed by the Parties to this Contract, constitutes a change to a Contract Document. Amendments to Supplements (hereinafter a "Supplement Amendment") shall be issued in accordance with the changes provisions of Section D and, if applicable, establish a Contract Price or Contract Time adjustment.

**APPLICABLE LAWS**, means federal, state and local laws, codes, rules, regulations and ordinances applicable to the Work and to the Contract.

**ARCHITECT/ENGINEER**, means the Person appointed by the Owner to make drawings and specifications and, to provide contract administration of the Work contemplated by the Contract to the extent provided herein or by supplemental instruction of Owner (under which Owner may delegate responsibilities to the Architect/Engineer), in accordance with ORS Chapter 671 (Architects) or ORS Chapter 672 (Engineers) and administrative rules adopted thereunder.

**CHANGE ORDER**, means a written order issued by the Owner to be later included as an Amendment. A Change Order shall not be effective until codified as an Amendment.

**CLAIM**, means a demand by Contractor pursuant to Section D.3 for review of the denial of Contractor's initial request for an adjustment of Contract terms, payment of money, extension of Contract Time or other relief, submitted in accordance with the requirements and within the time limits established for review of Claims in these OUS Retainer General Conditions.

**CONSTRUCTION CHANGE DIRECTIVE**, means a written order by the Owner to the Contractor requiring a change in the Work within the general scope of the Contract Documents, issued under the changes provisions of Section D.

**CONTRACT**, means the written agreement between the Owner and the Contractor comprised of the Contract Documents which describe the Work to be done and the obligations between the parties.

**CONTRACT DOCUMENTS**, means the Solicitation Document and addenda thereto, Instructions to Offerors, Supplemental Instructions to Offerors, the OUS Retainer Contract, OUS Retainer General Conditions, Retainer Supplemental General Conditions, if any, the accepted Offer, Plans, Specifications, Supplements, Amendments, and Construction Change Directives .

**CONTRACT PERIOD**, as set forth in the Contract Documents, means the total period of time beginning with the full execution of a Supplement and, if applicable, the issuance of a Notice to Proceed and concluding upon Final Completion.

**CONTRACT PRICE**, means the total of the awarded Offer amount, as increased or decreased by the price of approved alternates, as indicated in the Contract Documents.

**CONTRACT TIME**, means any incremental period of time allowed under the Contract to complete any portion of the Work as reflected in the project schedule.

**CONTRACTOR**, means the Person awarded the Contract for the Work contemplated.

**DAYS**, are calendar days, including weekdays, weekends and holidays, unless otherwise specified.

**DIRECT COSTS**, means, unless otherwise provided in the Contract Documents, the cost of materials, including sales tax, cost of delivery; cost of labor, including social security, Medicare and unemployment insurance, and fringe benefits required by agreement or custom; worker's compensation insurance; project specific insurance (including, without limitation, Builder's Risk Insurance and Builder's Risk Installation Floater); bond premiums, rental cost of equipment, and machinery required for execution of the Work; and the additional costs of field personnel directly attributable to the Work.

**FINAL COMPLETION**, means the final completion of all requirements under the Contract, including Contract Closeout as described in Section K but excluding Warranty Work as described in Section I.2, and the final payment and release of all retainage, if any, released.

**FORCE MAJEURE**, means an act, event or occurrence caused by fire, riot, war, acts of God, nature, sovereign, or public enemy, strikes, freight embargoes or any other act, event or occurrence that is beyond the control of the party to this Contract who is asserting Force Majeure.

**MWESB REPORT**, means an accurate report by the Contractor to the Owner identifying all Minority, Women and Emerging Small Business (MWESB) enterprises, as those terms are defined in ORS 200.005, receiving contracts throughout the course of the Work. An initial MWESB report is required (see Section E.2.9) and MWESB Reports are required annually (see Section E.2.9) and as a condition of final payment (see Section K.1). The initial report shall include the total number of contracts and subcontracts awarded to MWESB enterprises and the dollar value of their respective contracts and subcontracts. The annual reports shall include the total number of contracts and subcontracts awarded to MWESB enterprises, the dollar value of each, and the expenditure toward each contract and subcontract during the previous twelve (12) months. The final report shall include the total number of contracts and subcontracts awarded to MWESB enterprises and the dollar value of their respective contracts and subcontracts including all Supplements and Amendments incorporated during the course of the project. The reports shall only include enterprises certified with the State of Oregon as MWESB enterprises and shall include individual identification of each enterprise as a Minority business enterprise, a Women business enterprise, and/or an Emerging Small Business Enterprise, as applicable.

**NOTICE TO PROCEED**, means the official written notice from the Owner stating that the Contractor is to proceed with the Work defined in the Contract Documents. Notwithstanding the Notice to Proceed, Contractor shall not be authorized to proceed with the Work until all initial Contract requirements, including the Contract, performance bond and payment bond, and certificates of insurance, have been fully executed and submitted to Owner in a suitable form.

**OFFER**, means a bid in connection with Instructions to Bidders or a proposal in connection with a Request for Proposals.

**OFFEROR**, means a bidder in connection with Instructions to Bidders or a proposer in connection with a Request for Proposals.

**OVERHEAD**, means those items which may be included in the Contractor's markup (general and administrative expense and profit)

and that shall not be charged as Direct Cost of the Work, including without limitation such Overhead expenses as wages or salary of personnel above the level of foreman (i.e., superintendents and project managers), expenses of Contractor's offices and supplies at the job site (e.g. job trailer) and at Contractor's principal place of business and including expenses of personnel staffing the job site office and Contractor's principal place of business, and Commercial General Liability Insurance and Automobile Liability Insurance.

**OWNER**, means the State of Oregon acting by and through the Oregon State Board of Higher Education, in its own right or on behalf of one of its institutions as identified in the Solicitation Document, also known as the Oregon University System (OUS). Owner may elect, by written notice to Contractor, to delegate certain duties to more than one party, including without limitation, to an Architect/Engineer. However, nothing in these OUS Retainer General Conditions is intended to abrogate the separate design professional responsibilities of Architects under ORS Chapter 671 or of Engineers under ORS Chapter 672.

**PERSON**, means a natural person or entity doing business as a sole proprietorship, a partnership, a joint venture, a corporation, a limited liability company or partnership, or any other entity possessing the legal capacity to contract.

**PLANS**, means the drawings which show the location, type, dimensions, and details of the Work to be done under the Contract.

**PUNCH LIST**, means the list of Work yet to be completed or deficiencies which need to be corrected in order to achieve Final Completion of the Contract.

**RECORD DOCUMENT**, means the as-built Plans, Specifications, testing and inspection records, product data, samples, manufacturer and distributor/supplier warranties evidencing transfer of ownership to Owner, operational and maintenance manuals, shop drawings, Construction Change Directives, MWESB Reports, correspondence, certificate(s) of occupancy, and other documents listed in Subsection B.9.1 of these OUS Retainer General Conditions, recording all Services performed.

**SOLICITATION DOCUMENT**, means Instructions to Bidders or Offerors or a Request for Proposal or a Request for Quotes.

**SPECIFICATION**, means any description of the physical or functional characteristics of the Work, or of the nature of a supply, service or construction item. Specifications may include a description of any requirement for inspecting, testing or preparing a supply, service or construction item for delivery and the quantities or qualities of materials to be furnished under the Contract. Specifications generally will state the results or products to be obtained and may, on occasion, describe the method and manner of doing the Work to be performed. Specifications may be incorporated by reference and/or may be attached to the Contract.

**SUBCONTRACTOR**, means a Person having a direct contract with the Contractor, or another Subcontractor, to perform one or more items of the Work.

**SUBSTANTIAL COMPLETION**, means the date when the Owner accepts in writing the construction, alteration or repair of the improvement to real property constituting the Work or any designated portion thereof as having reached that state of completion when it may be used or occupied for its intended purpose. Substantial Completion of facilities with operating systems occurs only after thirty (30) continuous Days of successful, trouble-free operation of the operating systems as provided in Section K.4.2.

**SUBSTITUTIONS**, means items that in function, performance, reliability, quality, and general configuration are the same or better than the product(s) specified. Approval of any substitute item shall be solely determined by the Owner. The decision of the Owner is final.

**SUPPLEMENT**, means a writing which, when fully executed by the Parties thereto, constitutes written agreement between the Owner and the Contractor comprised of the Contract Documents which describe the Work to be done and the obligations between the parties.

**RETAINER SUPPLEMENTAL GENERAL CONDITIONS**, means those conditions that remove from, add to, or modify these OUS Retainer General Conditions. Retainer Supplemental General Conditions may be included in the Solicitation Document or may be a separate attachment to the Contract.

**WORK**, means the furnishing of all materials, equipment, labor, transportation, services and incidentals necessary to successfully complete any individual item or the entire Contract and the carrying out of duties and obligations imposed by the Contract Documents.

## **A.2 SCOPE OF WORK**

The Work contemplated under this Contract includes all labor, materials, transportation, equipment and services for, and incidental to, the completion of all construction work in connection with the project described in the Contract Documents. The Contractor shall perform all Work necessary so that the project can be legally occupied and fully used for the intended use as set forth in the Contract Documents.

## **A.3 INTERPRETATION OF CONTRACT DOCUMENTS**

A.3.1 Unless otherwise specifically defined in the Contract Documents, words which have well-known technical meanings or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Contract Documents are intended to be complementary. Whatever is called for in one, is interpreted to be called for in all. However, in the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following descending order of precedence:

- (a) Contract Supplements, Amendments and Construction Change Directives, with those of later date having precedence over those of an earlier date;
- (b) The Retainer Supplemental General Conditions;
- (c) The OUS Retainer Contract;
- (d) The OUS Retainer General Conditions;
- (e) Division One (General Requirements) of the Specifications;
- (f) Detailed Schedules of finishes, equipment and other items included in the Specifications;
- (g) Plans and Specifications (other than Division One and the Detailed Schedules to the Specifications);
- (h) Large-scale drawings on Plans;
- (i) Small-scale drawings on Plans;
- (j) Dimension numbers written on Plans which shall prevail and take precedence over dimensions scaled from Plans;
- (k) The Solicitation Document, and any addenda thereto;
- (l) The accepted Offer.

A.3.2 In the case of an inconsistency between Plans and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Owner's interpretation in writing.

A.3.3 If the Contractor finds discrepancies in, or omissions from the Contract Documents, or if the Contractor is in doubt as to their

meaning, the Contractor shall at once notify the Owner. Matters concerning and interpretation of requirements of the Contract Documents will be decided by the Owner, who may delegate that duty in some instances to the Architect/Engineer. Responses to Contractor's requests for interpretation of Contract Documents will be made in writing by Owner (or the Architect/Engineer) within any time limits agreed upon or otherwise with reasonable promptness. Interpretations and decisions of the Owner (or Architect/Engineer) will be consistent with the intent of and reasonably inferable from the Contract Documents. Contractor shall not proceed without direction in writing from the Owner (or Architect/Engineer).

- A.3.4 References to standard specifications, manuals, codes of any technical society, organization or association, to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, laws or regulations in effect in the jurisdiction where the project is occurring on the first published date of the Solicitation Document, except as may be otherwise specifically stated.

#### **A.4 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE**

- A.4.1 It is understood that the Contractor, before submitting an Offer, has made a careful examination of the Contract Documents; has become fully informed as to the quality and quantity of materials and the character of the Work required; and has made a careful examination of the location and conditions of the Work and the sources of supply for materials. The Owner will in no case be responsible for any loss or for any unanticipated costs that may be suffered by the Contractor as a result of the Contractor's failure to acquire full information in advance in regard to all conditions pertaining to the Work. No oral agreement or conversation with any officer, agent, or personnel of the Owner, or with the Architect/Engineer either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.
- A.4.2 Should the Plans or Specifications fail to particularly describe the materials, kind of goods, or details of construction of any aspect of the Work, Contractor shall have the duty to make inquiry of the Owner and Architect/Engineer as to what is required prior to performance of the Work. Absent Specifications to the contrary, the materials or processes that would normally be used to produce first quality finished Work shall be considered a part of the Contract requirements.
- A.4.3 Any design errors or omissions noted by the Contractor shall be reported promptly to the Owner, including without limitation, any nonconformity with Applicable Laws.
- A.4.4 If the Contractor believes that adjustments to cost or Contract Time is involved because of clarifications or instructions issued by the Owner (or Architect/Engineer) in response to the Contractor's notices or requests for information, the Contractor must submit a written request to the Owner, setting forth the nature and specific extent of the request, including all time and cost impacts against the Contract as soon as possible, but no later than thirty (30) Days after receipt by Contractor of the clarifications or instructions issued. If the Owner denies Contractor's request for additional compensation, additional Contract Time, or other relief that Contractor believes results from the clarifications or instructions, the Contractor may proceed to file a Claim under Section D.3, Claims Review Process. If the Contractor fails to perform the obligations of Sections A.4.1 to A.4.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations.

#### **A.5 INDEPENDENT CONTRACTOR STATUS**

The service or services to be performed under this Contract are those of an independent contractor as defined in ORS 670.600. Contractor represents and warrants that it is not an officer, employee or agent of the Owner as those terms are used in ORS 30.265.

#### **A.6 RETIREMENT SYSTEM STATUS AND TAXES**

Contractor represents and warrants that it is not a contributing member of the Public Employees' Retirement System and will be responsible for any federal or state taxes applicable to payment received under this Contract. Contractor will not be eligible for any benefits from these Contract payments of federal Social Security, employment insurance, workers' compensation or the Public Employees' Retirement System, except as a self-employed individual. Unless the Contractor is subject to backup withholding, Owner will not withhold from such payments any amount(s) to cover Contractor's federal or state tax obligations.

#### **A.7 GOVERNMENT EMPLOYMENT STATUS**

- A.7.1 If this payment is to be charged against federal funds, Contractor represents and warrants that it is not currently employed by the Federal Government. This does not preclude the Contractor from holding another contract with the Federal Government.
- A.7.2 Contractor represents and warrants that Contractor is not an employee of the State of Oregon for purposes of performing Work under this Contract

### **SECTION B ADMINISTRATION OF THE CONTRACT**

#### **B.1 OWNER'S ADMINISTRATION OF THE CONTRACT**

- B.1.1 The Owner shall administer the Contract as described in the Contract Documents (1) during construction (2) until final payment is due and (3) during the one-year period for correction of Work. The Owner will act as provided in the Contract Documents, unless modified in writing in accordance with other provisions of the Contract. In performing these tasks, the Owner may rely on the Architect/Engineer or other consultants to perform some or all of these tasks.
- B.1.2 The Owner will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the Work, and (3) to determine in general if Work is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. The Owner will not make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Owner will neither have control over or charge of, nor be responsible for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work.
- B.1.3 Except as otherwise provided in the Contract Documents or when direct communications have been specifically authorized, the Owner and Contractor shall communicate with each other about matters arising out of or relating to the Contract. Communications by and with the Architect/Engineer's consultants shall be through the Architect/Engineer. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.
- B.1.4 Based upon the Architect/Engineer's evaluations of the Contractor's Application for Payment, or unless otherwise stipulated by the Owner, the Architect/Engineer will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

**B.2 CONTRACTOR'S MEANS AND METHODS;  
MITIGATION OF IMPACTS**

- B.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures.
- B.2.2 The Contractor is responsible to protect and maintain the Work during the course of construction and to mitigate any adverse impacts to the project, including those caused by authorized changes, which may affect cost, schedule, or quality.
- B.2.3 The Contractor is responsible for the actions of all its personnel, laborers, suppliers, and Subcontractors on the project. The Contractor shall enforce strict discipline and good order among Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of persons who are unfit or unskilled for the tasks assigned to them.

**B.3 MATERIALS AND WORKMANSHIP**

- B.3.1 The intent of the Contract Documents is to provide for the construction and completion in every detail of the Work described. All Work shall be performed in a professional manner and unless the means or methods of performing a task are specified elsewhere in the Contract Documents, Contractor shall employ methods that are generally accepted and used by the industry, in accordance with industry standards.
- B.3.2 The Contractor is responsible to perform the Work as required by the Contract Documents. Defective Work shall be corrected at the Contractor's expense.
- B.3.3 Work done and materials furnished shall be subject to inspection and/or observation and testing by the Owner to determine if they conform to the Contract Documents. Inspection of the Work by the Owner does not relieve the Contractor of responsibility for the Work in accordance with the Contract Documents.
- B.3.4 Contractor shall furnish adequate facilities, as required, for the Owner to have safe access to the Work including without limitation walkways, railings, ladders, tunnels, and platforms. Producers, suppliers, and fabricators shall also provide proper facilities and access to their facilities.
- B.3.5 The Contractor shall furnish Samples of materials for testing by the Owner and include the cost of the Samples in the Contract Price.

**B.4 PERMITS**

Contractor shall obtain and pay for all necessary permits, licenses and fees, except for those specifically excluded in the Retainer Supplemental General Conditions, for the construction of the Work, for temporary obstructions, enclosures, opening of streets for pipes, walls, utilities, environmental Work, etc., as required for the project. Contractor shall be responsible for all violations of the law, in connection with the construction or caused by obstructing streets, sidewalks or otherwise. Contractor shall give all requisite notices to public authorities.

**B.5 COMPLIANCE WITH GOVERNMENT  
REGULATIONS**

- B.5.1 Contractor shall comply with Applicable Laws pertaining to the Work and the Contract. Failure to comply with such requirements shall constitute a breach of Contract and shall be grounds for Contract termination. Without limiting the generality of the foregoing, Contractor expressly agrees to comply with the following, as applicable:
- (i) Title VI and VII of Civil Rights Act of 1964, as amended;
  - (ii) Section 503 and 504 of the Rehabilitation Act of 1973, as amended;
  - (iii) the Health Insurance Portability and Accountability Act of 1996;
  - (iv) the Americans with Disabilities Act of 1990, as amended;
  - (v) ORS Chapter 659A; as amended;
  - (vi) all regulations and administrative rules established pursuant to the foregoing laws; and
  - (vii) all other applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations.
- B.5.2 Contractor shall comply with all applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations, and
- (a) Contractor shall not discriminate against Disadvantaged, Minority, Women or Emerging Small Business enterprises, as those terms are defined in ORS 200.005, or a business enterprise that is owned or controlled by or that employs a disabled veteran, as that term is defined in ORS 408.225, in the awarding of subcontracts.
  - (b) Contractor shall maintain, in current and valid form, all licenses and certificates required by Applicable Laws or this Contract when performing the Work.

- B.5.3 Unless contrary to federal law, Contractor shall certify that it shall not accept a bid from Subcontractors to perform Work as described in ORS 701.005 under this Contract unless such Subcontractors are registered with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 at the time they submit their bids to the Contractor.
- B.5.4 Unless contrary to federal law, Contractor shall certify that each landscape contractor, as defined in ORS 671.520(2), performing Work under this Contract holds a valid landscape contractor's license issued pursuant to ORS 671.560.
- B.5.5 The following notice is applicable to Contractors who perform excavation Work. ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center at (503)232-1987.
- B.5.6 Failure to comply with any or all of the requirements of B.5.1 through B.5.5 shall be a breach of Contract and constitute grounds for Contract termination. Damages or costs resulting from such noncompliance shall be the responsibility of Contractor.

**B.6 SUPERINTENDENCE**

Contractor shall keep on the site, during the progress of the Work, a competent superintendent and any necessary assistants who shall be satisfactory to the Owner and who shall represent the Contractor on the site. Directions given to the superintendent by the Owner shall be confirmed in writing to the Contractor.

**B.7 INSPECTION**

- B.7.1 Owner shall have access to the Work at all times.
- B.7.2 Inspection of the Work will be made by the Owner at its discretion. The Owner will have authority to reject Work that does not conform to the Contract Documents. Any Work found to be not in conformance with the Contract Documents, in the

discretion of the Owner, shall be removed and replaced at the Contractor's expense.

- B.7.3 Contractor shall make or obtain at the appropriate time all tests, inspections and approvals of portions of the Work required by the Contract Documents or by Applicable Laws or orders of public authorities having jurisdiction. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work. The Contractor shall give the Owner timely notice of when and where tests and inspections are to be made so that the Owner may be present for such procedures. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Owner.
- B.7.4 As required by the Contract Documents, Work done or material used without required inspection or testing and/or without providing timely notice to the Owner may be ordered removed at the Contractor's expense.
- B.7.5 If directed to do so any time before the Work is accepted, the Contractor shall uncover portions of the completed Work for inspection. After inspection, the Contractor shall restore such portions of Work to the standard required by the Contract. If the Work uncovered is unacceptable or was done without required testing or inspection or sufficient notice to the Owner, the uncovering and restoration shall be done at the Contractor's expense. If the Work uncovered is acceptable and was done with sufficient notice to the Owner, the uncovering and restoration will be paid for pursuant to a Supplement Amendment.
- B.7.6 If any testing or inspection reveals failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Owner's and Architect/Engineer's services and expenses, shall be at the Contractor's expense.
- B.7.7 When the United States government participates in the cost of the Work, or the Owner has an agreement with other public or private organizations, or if any portion of the Work is being performed for a third party or in close proximity to third party facilities, representatives of these organizations shall have the right to inspect the Work affecting their interests or property. Their right to inspect shall not make them a party to the Contract and shall not interfere with the rights of the parties of the Contract. Instructions or orders of such parties shall be transmitted to the Contractor, through the Owner.

#### **B.8 SEVERABILITY**

If any provision of this Contract is declared by a court to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular provision held to be invalid.

#### **B.9 ACCESS TO RECORDS**

- B.9.1 Contractor shall keep, at all times on the Work site, one record copy of the complete Contract Documents, including the Plans, Specifications, Construction Change Directives and addenda, in good order and marked currently to record field changes and selections made during construction, and one record copy of Shop Drawings, Product Data, Samples and similar submittals, and shall at all times give the Owner access thereto.

- B.9.2 Contractor shall retain and the Owner and its duly authorized representatives shall have access, for a period not less than ten (10) years, to all Record Documents, financial and accounting records, and other books, documents, papers and records of Contractor which are pertinent to the Contract, including records pertaining to Overhead and indirect costs, for the purpose of making audit, examination, excerpts and transcripts. If for any reason, any part of the Work or this Contract shall be subject to litigation, Contractor shall retain all such records until all litigation is resolved and Contractor shall continue to provide Owner and/or its agents with full access to such records until such time as all litigation is complete and all periods for appeal have expired and full and final satisfaction of any judgment, order or decree is recorded and Owner receives a record copy of documentation from Contractor.

#### **B.10 WAIVER**

Failure of the Owner to enforce any provision of this Contract shall not constitute a waiver or relinquishment by the Owner of the right to such performance in the future nor of the right to enforce any other provision of this Contract.

#### **B.11 SUBCONTRACTS AND ASSIGNMENT**

- B.11.1 Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound by the terms and conditions of these OUS Retainer General Conditions, and to assume toward the Contractor all of the obligations and responsibilities which the Contractor assumes toward the Owner thereunder, unless (1) the same are clearly inapplicable to the subcontract at issue because of legal requirements or industry practices, or (2) specific exceptions are requested by Contractor and approved in writing by Owner. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with sub-subcontractors at any level.
- B.11.2 At Owner's request, Contractor shall submit to Owner prior to their execution either Contractor's form of subcontract, or the subcontract to be executed with any particular Subcontractor. If Owner disapproves such form, Contractor shall not execute the form until the matters disapproved are resolved to Owner's satisfaction. Owner's review, comment upon or approval of any such form shall not relieve Contractor of its obligations under this Agreement or be deemed a waiver of such obligations of Contractor.

- B.11.3 Contractor shall not assign, sell, or transfer its rights, or delegate its responsibilities under this Contract, in whole or in part, without the prior written approval of the Owner. No such written approval shall relieve Contractor of any obligations of this Contract, and any transferee shall be considered the agent of the Contractor and bound to perform in accordance with the Contract Documents. Contractor shall remain liable as between the original parties to the Contract as if no assignment had occurred.

#### **B.12 SUCCESSORS IN INTEREST**

The provisions of this Contract shall be binding upon and shall accrue to the benefit of the parties to the Contract and their respective permitted successors and assigns.

#### **B.13 OWNER'S RIGHT TO DO WORK**

Owner reserves the right to perform other or additional work at or near the project site with other forces than those of the Contractor. If such work takes place within or next to the project site, Contractor shall coordinate work with the other contractors or forces, cooperate with all other contractors or forces, carry out the Work in a way that will minimize interference and delay for all forces involved, place and

dispose of materials being used so as not to interfere with the operations of another, and join the Work with the work of the others in an acceptable manner and perform it in proper sequence to that of the others. The Owner will resolve any disagreements that may arise between or among Contractor and the other contractors over the method or order of doing all work (including the Work). In case of unavoidable interference, the Owner will establish work priority (including the Work) which generally will be in the sequence that the contracts were awarded.

#### **B.14 OTHER CONTRACTS**

In all cases and at any time, the Owner has the right to execute other contracts related to or unrelated to the Work of this Contract. The Contractor of this Contract shall fully cooperate with any and all other contractors without additional cost to the Owner in the manner described in section B.13.

#### **B.15 GOVERNING LAW**

This Contract shall be governed by and construed in accordance with the laws of the State of Oregon without regard to principles of conflict of laws.

#### **B.16 LITIGATION**

Any Claim between Owner and Contractor that arises from or relates to this Contract and that is not resolved through the Claims Review Process in Section D.3 shall be brought and conducted solely and exclusively within the Circuit Court of Marion County for the State of Oregon; provided, however, if a Claim must be brought in a federal forum, then it shall be brought and conducted solely and exclusively within the United States District Court for the District of Oregon. In no event shall this section be construed as a waiver by the State of Oregon on any form of defense or immunity, whether sovereign immunity, governmental immunity, immunity based on the Eleventh Amendment to the Constitution of the United States or otherwise, from any claim or from the jurisdiction of any court. CONTRACTOR, BY EXECUTION OF THIS CONTRACT, HEREBY CONSENTS TO THE IN PERSONAM JURISDICTION OF THE COURTS REFERENCED IN THIS SECTION B.16.

#### **B.17 ALLOWANCES**

B.17.1 The Contractor shall include in the Contract Price all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct.

B.17.2 Unless otherwise provided in the Contract Documents:

- (a) when finally reconciled, allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- (b) Contractor's costs for unloading and handling at the site, labor, installation costs, Overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Price but not in the allowances;
- (c) whenever costs are more than or less than allowances, the Contract Price shall be adjusted accordingly by Amendment. The amount of the Amendment shall reflect (i) the difference between actual costs and the allowances under Section B.17.2(a) and (2) changes in Contractor's costs under Section B.17.2(b).
- (d) Unless Owner requests otherwise, Contractor shall provide to Owner a proposed fixed price for any allowance work prior to its performance.

#### **B.18 SUBMITTALS, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

B.18.1 The Contractor shall prepare and keep current, for the Architect's/Engineer's approval (or for the approval of Owner if approval authority has not been delegated to the Architect/Engineer), a schedule and list of submittals which is coordinated with the Contractor's construction schedule and allows the Architect/Engineer reasonable time to review submittals. Owner reserves the right to finally approve the schedule and list of submittals. Submittals include, without limitation, Shop Drawings, Product Data, and Samples which are described below:

- (a) Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor (including any sub-subcontractor), manufacturer, supplier or distributor to illustrate some portion of the Work.
- (b) Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- (c) Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

B.18.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review of submittals by the Architect/Engineer is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, or for approval of safety precautions or, unless otherwise specifically stated by the Architect/Engineer, of any construction means, methods, techniques, sequences or procedures, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect/Engineer's review of the Contractor's submittals shall not relieve the Contractor of its obligations under the Contract Documents. The Architect/Engineer's approval of a specific item shall not indicate approval of an assembly of which the item is a component. Informational submittals upon which the Architect/Engineer is not expected to take responsive action may be so identified in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect/Engineer without action.

B.18.3 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect/Engineer Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect/Engineer without action.

B.18.4 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

B.18.5 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect/Engineer.

B.18.6 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect/Engineer's review or approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect/Engineer in writing of such deviation at the time of submittal and (i) the Architect/Engineer has given written approval to the specific deviation as a minor change in the Work, or (ii) a Supplement Amendment or Construction Change Directive has been executed by Owner authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect/Engineer's review or approval thereof.

B.18.7 In the event that Owner elects not to have the obligations and duties described under this Section B.18 performed by the Architect/Engineer, or in the event no Architect/Engineer is employed by Owner on the project, all obligations and duties assigned to the Architect/Engineer hereunder shall be performed by the Owner.

#### **B.19 SUBSTITUTIONS**

The Contractor may make Substitutions only with the consent of the Owner, after evaluation by the Owner and only in accordance with a Supplement Amendment or Construction Change Directive. Substitutions shall be subject to the requirements of the bid documents. By making requests for Substitutions, the Contractor: represents that the Contractor has personally investigated the proposed substitute product; represents that the Contractor will provide the same warranty for the Substitution that the Contractor would for the product originally specified unless approved otherwise; certifies that the cost data presented is complete and includes all related costs under this Contract including redesign costs, and waives all claims for additional costs related to the Substitution which subsequently become apparent; and will coordinate the installation of the accepted Substitution, making such changes as may be required for the Work to be completed in all respects.

#### **B.20 USE OF PLANS AND SPECIFICATIONS**

Plans, Specifications and related Contract Documents furnished to Contractor by Owner or Owner's Architect/Engineer shall be used solely for the performance of the Work under this Contract. Contractor and its Subcontractors and suppliers are authorized to use and reproduce applicable portions of such documents appropriate to the execution of the Work, but shall not claim any ownership or other interest in them beyond the scope of this Contract, and no such interest shall attach. Unless otherwise indicated, all common law, statutory and other reserved rights, in addition to copyrights, are retained by Owner.

#### **B.21 FUNDS AVAILABLE AND AUTHORIZED**

Owner reasonably believes at the time of entering into this Contract that sufficient funds are available and authorized for expenditure to finance the cost of this Contract within the Owner's appropriation or limitation. Contractor understands and agrees that, to the extent that sufficient funds are not available and authorized for expenditure to finance the cost of this Contract, Owner's payment of amounts under this Contract attributable to Services performed after the last day of the current biennium is contingent on Owner receiving from the Oregon Legislative Assembly appropriations, limitations or other expenditure authority sufficient to allow Owner, in the exercise of its reasonable administrative discretion, to continue to make payments under this Contract.

#### **B.22 NO THIRD PARTY BENEFICIARIES**

Owner and Contractor are the only parties to this Contract and are the only parties entitled to enforce its terms. Nothing in this Contract gives, is intended to give, or shall be construed to give or provide any benefit or right, whether directly, indirectly, or otherwise, to third persons unless such third persons are individually identified by name herein and expressly described as intended beneficiaries of the terms of this Contract.

### **SECTION C WAGES AND LABOR**

#### **C.1 MINIMUM WAGE RATES ON PUBLIC WORKS**

Contractor shall comply fully with the provisions of ORS 279C.800 through 279C.870. Documents establishing those conditions, as determined by the Commissioner of the Bureau of Labor and Industries (BOLI), are included as attachments to or are incorporated by reference in the Contract Documents. Pursuant to ORS 279C.830(1)(d), Contractor shall pay workers at not less than the specified minimum hourly rate of wage, and shall include that requirement in all subcontracts. If the Work is subject to both the state prevailing wage rate law and the federal Davis-Bacon Act, Contractor shall pay the higher of the applicable state or federal prevailing rate of wage. Contractor shall provide written notice to all workers of the number of hours per day and days per week such workers may be required to work.

#### **C.2 PAYROLL CERTIFICATION AND FEE REQUIREMENTS**

C.2.1 In accordance with ORS 279C.845, the Contractor and every Subcontractor shall submit written certified statements to the Owner, on the form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each worker which the Contractor or the Subcontractor has employed on the project and further certifying that no worker employed on the project has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the Contract, which certificate and statement shall be verified by the oath of the Contractor or the Subcontractor that the Contractor or Subcontractor has read the certified statement, that the Contractor or Subcontractor knows the contents of the certified statement, and, that to the Contractor's or Subcontractor's best knowledge and belief, the certified statement is true. The certified statements shall set out accurately and completely the payroll records for the prior week, including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Certified statements for each week during which the Contractor or Subcontractor has employed a worker on the project shall be submitted once a month, by the fifth business day of the following month. The Contractor and Subcontractors shall preserve the certified statements for a period of ten (10) years from the date of completion of the Contract.

C.2.2 Pursuant to ORS 279C.845(7), the Owner shall retain 25 percent of any amount earned by the Contractor on this public works project until the Contractor has filed the certified statements required by section C.2.1. The Owner shall pay to the Contractor the amount retained under this subsection within 14 days after the Contractor files the required certified statements, regardless of whether a Subcontractor has failed to file certified statements.

C.2.3 Pursuant to ORS 279C.845(8), the Contractor shall retain 25 percent of any amount earned by a first-tier Subcontractor on this public works project until the first-tier Subcontractor has

filed with the Owner the certified statements required by C.2.1. Before paying any amount retained under this subsection, the Contractor shall verify that the first-tier Subcontractor has filed the certified statement. Within 14 days after the first-tier Subcontractor files the required certified statement the Contractor shall pay the first-tier Subcontractor any amount retained under this subsection.

- C.2.4 In accordance with statutory requirements and administrative rules promulgated by the Commissioner of the Bureau of Labor and Industries, the fee required by ORS 279C.825(1) will be paid by Owner to the Commissioner.

### **C.3 PROMPT PAYMENT AND CONTRACT CONDITIONS**

C.3.1 As a condition to Owner's performance hereunder, the Contractor shall:

C.3.1.1 Make payment promptly, as due, to all persons supplying to Contractor labor or materials for the prosecution of the Work provided for in this Contract.

C.3.1.2 Pay all contributions or amounts due the State Industrial Accident Fund from such Contractor or Subcontractor incurred in the performance of the Contract.

C.3.1.3 Not permit any lien or claim to be filed or prosecuted against the Owner on account of any labor or material furnished. Contractor will not assign any claims that Contractor has against Owner, or assign any sums due by Owner, to Subcontractors, suppliers, or manufacturers, and will not make any agreement or act in any way to give Subcontractors a claim or standing to make a claim against the Owner.

C.3.1.4 Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

C.3.2 As a condition to Owner's performance hereunder, if Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor of a Subcontractor by any person in connection with the project as such claim becomes due, the proper officer(s) representing the Owner may pay the claim and charge the amount of the payment against funds due or to become due Contractor under this Contract. Payment of claims in this manner shall not relieve the Contractor or the Contractor's surety from obligation with respect to any unpaid claims.

C.3.3 Contractor shall include in each subcontract for property or services entered into by the Contractor and a first-tier subcontractor, including a material supplier, for the purpose of performing a construction contract, a payment clause that obligates the Contractor to pay the first-tier Subcontractor for satisfactory performance under its subcontract within ten (10) Days out of such amounts as are paid to the Contractor by the public contracting agency under such contract.

C.3.4 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.

### **C.4 PAYMENT FOR MEDICAL CARE**

As a condition to Owner's performance hereunder, Contractor shall promptly, as due, make payment to any person, partnership, association or corporation furnishing medical, surgical, and hospital care or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, all sums of which the Contractor

agrees to pay for such services and all moneys and sums which the Contractor has collected or deducted from the wages of personnel pursuant to any law, contract or agreement for the purpose of providing or paying for such services.

### **C.5 HOURS OF LABOR**

As a condition to Owner's performance hereunder, no person shall be employed to perform Work under this Contract for more than ten (10) hours in any one day or forty (40) hours in any one week, except in cases of necessity, emergency or where public policy absolutely requires it. In such instances, Contractor shall pay the employee at least time and a half pay:

- (a) For all overtime in excess of eight (8) hours a day or forty (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 ten (10) hours a day or forty (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.

This section C.5 will not apply to Contractor's Work under this Contract to the extent Contractor is currently a party to a collective bargaining agreement with any labor organization.

This Section C.5 shall not excuse Contractor from completion of the Work within the time required under this Contract.

## **SECTION D CHANGES IN THE WORK**

### **D.1 CHANGES IN WORK**

D.1.1 The terms of this Contract shall not be waived, altered, modified, supplemented or amended in any manner whatsoever, without prior written agreement and then only after any necessary approvals have been obtained. A Supplement or Amendment is required, which shall not be effective until its execution by the parties to this Contract and all approvals required by public contracting laws have been obtained.

D.1.2 It is mutually agreed that changes in Plans, quantities, or details of construction are inherent in the nature of construction and may be necessary or desirable during the course of construction. Within the general scope of this Contract, the Owner may at any time, without notice to the sureties and without impairing the Contract, require changes consistent with this Section D.1. All changes to the Work shall be documented and Amendments shall be executed under the conditions of the Contract Documents. Such changes may include, but are not limited to:

- (a) Modification of specifications and design.
- (b) Increases or decreases in quantities.
- (c) Increases or decreases to the amount of Work.
- (d) Addition or elimination of any Work item.
- (e) Change in the duration of the project.
- (f) Acceleration or delay in performance of Work.
- (g) Deductive changes.

Deductive changes are those that reduce the scope of the Work, and shall be made by mutual agreement whenever feasible. In cases of suspension or partial termination under Section J, Owner reserves the right to unilaterally impose a deductive change and to self perform such Work, for which the provisions of B.13 (Owner's Right to Do Work) shall then apply. Adjustments in compensation shall be made under the provisions of D.1.3, in which costs for deductive changes shall be based upon a Direct Costs adjustment together with the related



percentage markup specified for profit, Overhead and other indirect costs, unless otherwise agreed to by Owner.

D.1.3 The Owner and Contractor agree that adjustments to or deletions from the Work shall be administered and compensated according to the following:

- (a) Unit pricing may be utilized at the Owner's option when unit prices or solicitation alternates were provided that established the cost for adjustments to Work, and a binding obligation exists under the Contract on the parties covering the terms and conditions of the adjustment to Work.
- (b) If the Owner elects not to utilize unit pricing, or in the event that unit pricing is not available or appropriate, fixed pricing may be used for adjustments to or deletions from the Work. In fixed pricing the basis of payments or total price shall be agreed upon in writing between the parties to the Contract, and shall be established before the Work is done whenever feasible. Notwithstanding the foregoing, the mark-ups set forth in D.1.3(c) shall be utilized in establishing fixed pricing, and such mark-ups shall not be exceeded. Cost and price data relating to adjustments to or deletions from the Work shall be supplied by Contractor to Owner upon request, but Owner shall be under no obligation to make such requests.
- (c) In the event that unit pricing and fixed pricing are not utilized, then adjustments to or deletions from the Work shall be performed on a cost reimbursement basis for Direct Costs. Such Work shall be compensated on the basis of the actual, reasonable and allowable cost of labor, equipment, and material furnished on the Work performed. In addition, the following markups shall be added to the Contractor's or Subcontractor's Direct Costs as full compensation for profit, Overhead and other indirect costs for Work directly performed with the Contractor's or Subcontractor's own forces:

On Labor.....	15%
On Equipment.....	10%
On Materials.....	10%

- (d) When adjustments to or deletions from the Work under D.1.3(c) are invoiced by an authorized Subcontractor at any level, each ascending tier Subcontractor or Contractor will be allowed a supplemental mark-up on each piece of subcontract Work covered by a an Amendment as follows:

\$0.00 - \$5,000.00	10%, and then
Over \$5,000.00	5%

Payments made to the Contractor shall be complete compensation for Overhead, profit, and all costs that were incurred by the Contractor or by other forces furnished by the Contractor, including Subcontractors, for adjustments to or deletions from the Work pursuant to a Supplement Amendment. Owner may establish a maximum cost for additional Work under this Section D.1.3, which shall not be exceeded for reimbursement without additional written authorization from Owner in the form of a Supplement Amendment. Contractor shall not be required to complete such additional Work without additional authorization.

D.1.4 Any necessary adjustment of Contract Time that may be required as a result of adjustments to or deletions from the Work must be agreed upon by the parties before the start of the revised Work unless Owner authorizes Contractor to start the revised Work before agreement on Contract Time adjustment. Contractor shall submit any request for additional compensation (and additional Contract Time if Contractor was authorized to start Work before an adjustment of Contract Time was

approved) as soon as possible but no later than thirty (30) Days after receipt of Owner's request for additional Work. If Contractor's request for additional compensation or adjustment of Contract Time is not made within the thirty (30) Day time limit, Contractor's requests pertaining to that additional Work shall be barred. The thirty (30) Day time limit for making requests shall not be extended for any reason, including without limitation Contractor's claimed inability to determine the amount of additional compensation or adjustment of Contract Time, unless an extension is granted in writing by Owner. If the Owner denies Contractor's request for additional compensation or adjustment of Contract Time, Contractor may proceed to file a Claim under Section D.3, Claims Review Process. No other reimbursement, compensation, or payment will be made, except as provided in Section D.1.5 for impact claims.

D.1.5 If any adjustment to Work under Section D.1.3 causes an increase or decrease in the Contractor's cost of, or the Contract Time required for the performance of any other part of the Work under this Contract, Contractor shall submit a written request to the Owner, setting forth the nature and specific extent of the request, including all time and cost impacts against the Contract as soon as possible, but no later than thirty (30) Days after receipt of Owner's request for adjustments to or deletions from the Work by Contractor.

The thirty (30) Day time limit applies to claims of Subcontractors, suppliers, or manufacturers who may be affected by Owner's request for adjustments to or deletions from the Work and who request additional compensation or an extension of Contract Time to perform; Contractor has responsibility for contacting its Subcontractors, suppliers, or manufacturers within the thirty (30) Day time limit, and including their requests with Contractor's requests. If the request involves Work to be completed by Subcontractors, or materials to be furnished by suppliers or manufacturers, such requests shall be submitted to the Contractor in writing with full analysis and justification for the adjustments to compensation and Contract Time requested. The Contractor shall analyze and evaluate the merits of the requests submitted by Subcontractors, suppliers, and manufacturers to Contractor prior to including those requests and Contractor's analysis and evaluation of those requests with Contractor's requests for adjustments to compensation or Contract Time that Contractor submits to the Owner. Failure of Subcontractors, suppliers, manufacturers or others to submit their requests to Contractor for inclusion with Contractor's requests submitted to Owner within the time period and by the means described in this section shall constitute a waiver of these Subcontractor claims. The Owner will not consider direct requests or claims from Subcontractors, suppliers, manufacturers or others not a party to this Contract. The consideration of such requests and claims under this section does not give any Person, not a party to the Contract the right to bring a claim against Owner, whether in this claims process, in litigation, or in any dispute resolution process.

If the Owner denies the Contractor's request for adjustment to compensation or Contract Time, the Contractor may proceed to file a Claim under Section D.3, Claims Review Process.

D.1.6 No request or Claim by the Contractor for additional costs or an adjustment of Contract Time shall be allowed if made after receipt of final payment application under this Contract. Final payment application must be made by Contractor within the time required under Section E.6.4.

D.1.7 It is understood that changes in the Work are inherent in construction of this type. The number of changes, the scope of those changes, and the effect they have on the progress of the original Work cannot be defined at this time. The Contractor is notified that numerous changes may be required and that there will be no compensation made, unless and only to the extent otherwise provided in the Contract Documents, to the Contractor

directly related to the number of changes. Each change will be evaluated for extension of Contract Time and increase or decrease in compensation based on its own merit.

## **D.2 DELAYS**

D.2.1 Delays in construction include "Avoidable Delays", which are defined in Section D.2.1.1, and "Unavoidable Delays", which are defined in Section D.2.1.2. The effect of Avoidable Delays is described in Section D.2.2 and the effect of Unavoidable Delays is described in Section D.2.3.

D.2.1.1 Avoidable Delays include any delays other than Unavoidable Delays, and include delays that otherwise would be considered Unavoidable Delays but that:

- (a) Could have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its Subcontractors.
- (b) Affect only a portion of the Work and do not necessarily prevent or delay the prosecution of neither other parts of the Work nor the completion of the whole Work within the Contract Time.
- (c) Do not impact activities on the accepted critical path schedule.
- (d) Are associated with the reasonable interference of other contractors employed by the Owner that do not necessarily prevent the completion of the whole Work within the Contract Time.

D.2.1.2 Unavoidable Delays include delays other than Avoidable Delays that are:

- (a) To the extent caused by any actions of the Owner, or any other employee or agent of the Owner, or by separate contractor employed by the Owner.
- (b) To the extent caused by any site conditions which differ materially from what was represented in the Contract Documents or from conditions that would normally be expected to exist and be inherent to the construction activities defined in the Contract Documents. The Contractor shall notify the Owner immediately of differing site conditions before the area has been disturbed. The Owner will investigate the area and make a determination as to whether or not the conditions differ materially from either the conditions stated in the Contract Documents or those which could reasonably be expected in execution of this particular Contract. If Contractor and the agrees that a differing site condition exists, any adjustment to compensation or Contract Time will be determined based on the process set forth in Section D.1.5 for adjustments to or deletions from Work. If the Owner disagrees that a differing site condition exists and denies Contractor's request for additional compensation or Contract Time, Contractor may proceed to file a Claim under Section D.3, Claims Review Process.
- (c) To the extent caused by Force Majeure acts, events or occurrences that could not have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its Subcontractors.
- (d) To the extent caused by adverse weather conditions. Any adverse weather conditions must be substantiated by documentary evidence that weather conditions were abnormal for the specific time period claimed, could not have been anticipated by the Contractor, and adversely impacted the project in a manner that could not be avoided by rescheduling the Work or by implementing measures to

protect against the weather so that the Work could proceed. A rain, windstorm, high water, or other natural phenomenon for the specific locality of the Work, which might reasonably have been anticipated from the previous 10-year historical records of the general locality of the Work, shall not be construed as abnormal. The parties agree that rainfall greater than the following levels cannot be reasonably anticipated:

- (i) Daily rainfall equal to, or greater than, 0.50 inch during a month when the monthly rainfall exceeds the normal monthly average by twenty-five percent (25 %) or more.
- (ii) daily rainfall equal to, or greater than, 0.75 inch at any time.

The Office of the Environmental Data Service of the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce nearest the project site shall be considered the official agency of record for weather information.

D.2.2 Contractor shall not be entitled to additional compensation or additional Contract Time for Avoidable Delays.

D.2.3 In the event of Unavoidable Delays, based on principles of equitable adjustment, Contractor may be entitled to the following:

- (a) Contractor may be entitled to additional compensation or additional Contract Time, or both, for Unavoidable Delays described in Section D.2.1.2 (a) and (b).
- (b) Contractor may be entitled to additional Contract Time for Unavoidable Delays described in Section D.2.1.2(c) and (d).

In the event of any requests for additional compensation or additional Contract Time, or both, as applicable, arising under this Section D.2.3 for Unavoidable Delays, other than requests for additional compensation or additional Contract Time for differing site conditions for which a review process is established under Section D.2.1.2 (b), Contractor shall submit a written notification of the delay to the Owner within two (2) Days of the occurrence of the cause of the delay. This written notification shall state the cause of the potential delay, the project components impacted by the delay, and the anticipated additional Contract Time extension or the additional compensation, or both, as applicable, resulting from the delay. Within seven (7) Days after the cause of the delay has been mitigated, or in no case more than thirty (30) Days after the initial written notification, the Contractor shall submit to the Owner, a complete and detailed request for additional compensation or additional Contract Time, or both, as applicable, resulting from the delay. If the Owner denies Contractor's request for additional compensation or adjustment of Contract Time, the Contractor may proceed to file a Claim under Section D.3, Claims Review Process.

If Contractor does not timely submit the notices required under this Section D.2, then unless otherwise prohibited by law, Contractor's Claim shall be barred.

## **D.3 CLAIMS REVIEW PROCESS**

D.3.1 All Contractor Claims shall be referred to the Owner for review. Contractor's Claims, including Claims for adjustments to compensation or Contract Time, shall be submitted in writing by Contractor to the Owner within five (5) Days after a denial of Contractor's initial request for an adjustment of Contract terms, payment of money, extension of Contract Time or other relief, provided that such initial request has been submitted in accordance with the requirements and within the time limits

established in these OUS Retainer General Conditions. Within thirty (30) Days after the initial Claim, Contractor shall submit to the Owner a complete and detailed description of the Claim (the "Detailed Notice") that includes all information required by Section D.3.2. Unless the Claim is made in accordance with these time requirements, it shall be waived by Contractor.

- D.3.2 The Detailed Notice of the Claim shall be submitted in writing by Contractor and shall include a detailed, factual statement of the basis of the Claim, pertinent dates, Contract provisions which support or allow the Claim, reference to or copies of any documents which support the Claim, the dollar value of the Claim, and the Contract Time adjustment requested for the Claim. If the Claim involves Work to be completed by Subcontractors, the Contractor will analyze and evaluate the merits of the Subcontractor claim prior to forwarding it and that analysis and evaluation to the Owner. The Owner will not consider direct claims from Subcontractors, suppliers, manufacturers, or others not a party to this Contract. Contractor agrees that it will make no agreement, covenant, or assignment, nor will it commit any other act that will permit or assist any Subcontractor, supplier, manufacturer, or other to directly or indirectly make a claim against Owner.
- D.3.3 The Owner will review all Claims and take one or more of the following preliminary actions within ten (10) Days of receipt of the Detailed Notice of a Claim: (1) request additional supporting information from the Contractor; (2) inform the Contractor and Owner in writing of the time required for adequate review and response; (3) reject the Claim in whole or in part and identify the reasons for rejection; (4) based on principles of equitable adjustment, recommend approval of all or part of the Claim; or (5) propose an alternate resolution.
- D.3.4 The Owner's decision shall be final and binding on the Contractor unless appealed by written notice to the Owner within fifteen (15) Days of receipt of the decision. The Contractor must present written documentation supporting the Claim within fifteen (15) Days of the notice of appeal. After receiving the appeal documentation, the Owner shall review the materials and render a decision within thirty (30) Days after receiving the appeal documents.
- D.3.5 The decision of the Owner shall be final and binding unless the Contractor delivers to the Owner its request for mediation, which shall be a non-binding process, within fifteen (15) Days of the date of the Owner's decision. The mediation process will be considered to have commenced as of the date the Contractor delivers the request. Both parties acknowledge and agree that participation in mediation is a prerequisite to commencement of litigation of any disputes relating to the Contract. Both parties further agree to exercise their best efforts in good faith to resolve all disputes within sixty (60) Days of the commencement of the mediation through the mediation process set forth herein.
- In the event that a lawsuit must be filed within this sixty (60) Day period in order to preserve a cause of action, the parties agree that, notwithstanding the filing, they shall proceed diligently with the mediation to its conclusion prior to actively prosecuting the lawsuit, and shall seek from the Court in which the lawsuit is pending such stays or extensions, including the filing of an answer, as may be necessary to facilitate the mediation process. Further, in the event settlements are reached on any issues through mediation, the plaintiff shall promptly cause to be entered by the Court a stipulated general judgment of dismissal with prejudice, or other appropriate order limiting the scope of litigation as provided in the settlement.
- D.3.6 Should the parties arrive at an impasse regarding any Claims or disputed Claims, it is agreed that the parties shall participate in mediation as specified in Section D.3.5. The mediation process will be considered to have been commenced as of the date one

party delivers to the other its request in writing to mediate. The mediator shall be an individual mutually acceptable to both parties, but in the absence of agreement each party shall select a temporary mediator and the temporary mediators shall jointly select the permanent mediator. Each party shall pay its own costs for the time and effort involved in mediation. The cost of the mediator shall be split equally between the two parties. Both parties agree to exercise their best effort in good faith to resolve all disputes in mediation. Participation in mediation is a mandatory requirement of both the Owner and the Contractor. The schedule, time and place for mediation will be mutually acceptable, or, failing mutual agreement, shall be as established by the mediator. The parties agree to comply with Owner's administrative rules governing the confidentiality of mediation, if any, and shall execute all necessary documents to give effect to such confidentiality rules. In any event, the parties shall not subpoena the mediator or otherwise require the mediator to produce records, notes or work product, or to testify in any future proceedings as to information disclosed or representations made in the course of mediation, except to the extent disclosure is required by law.

- D.3.7 Unless otherwise directed by Owner, Contractor shall proceed with the Work while any Claim, or mediation or litigation arising from a Claim, is pending. Regardless of the review period or the final decision of the Owner, the Contractor shall continue to diligently pursue the Work as identified in the Contract Documents. In no case is the Contractor justified or allowed to cease or Delay Work, in whole or in part, without a written stop work order from the Owner.

## **SECTION E PAYMENTS**

### **E.1 SCHEDULE OF VALUES**

The Contractor shall submit, at least ten (10) Days prior to submission of its first application for progress payment, a schedule of values ("Schedule of Values") for the contracted Work. This schedule shall provide a breakdown of values for the contracted Work and will be the basis for progress payments. The breakdown shall demonstrate reasonable, identifiable, and measurable components of the Work. Unless objected to by the Owner, this schedule shall be used as the basis for reviewing Contractor's applications for payment. If objected to by Owner, Contractor shall revise the schedule of values and resubmit the same for approval of Owner.

### **E.2 APPLICATIONS FOR PAYMENT**

E.2.1 Owner shall make progress payments on the Contract monthly as Work progresses, in accordance with the requirements of this Section E.2. Applications for payment shall be based upon estimates of Work completed and the Schedule of Values. As a condition precedent to Owner's obligation to pay, all applications for payment shall be approved by the Owner. A progress payment shall not be considered acceptance or approval of any Work or waiver of any defects therein. Owner shall pay to Contractor interest for overdue invoices at the rate of two-thirds of one percent per month on the progress payment, not including retainage, due the Contractor. Overdue invoices will be those that have not been paid within forty five (45) days from the latest of:

- (a) The date of the receipt of the accurate invoice;
- (b) The date Owner receives the correct application for payment if no invoice is received;
- (c) The date all goods and services have been received; or
- (d) The date a Claim is made certain by agreement of the parties or by operation of law.

Notwithstanding the foregoing, in instances when an application for payment is filled out incorrectly, or when there is any defect or impropriety in any submitted application or when there is a good faith dispute, Owner shall so notify the Contractor within fifteen (15) Days stating the reason or reasons the application for payment is defective or improper or the reasons for the dispute. A defective or improper application for payment, if corrected by the Contractor within seven (7) Days of being notified by the Owner, shall not cause a payment to be made later than specified in this section unless interest is also paid. Payment of interest will be postponed when payment on the principal is delayed because of disagreement between the Owner and the Contractor.

Owner reserves the right, instead of requiring the Contractor to correct or resubmit a defective or improper application for payment, to reject the defective or improper portion of the application for payment and pay the remainder of the application for such amounts which are correct and proper.

Owner, upon written notice to the Contractor, may elect to make payments to the Contractor only by means of Electronic Funds Transfers (EFT) through Automated Clearing House (ACH) payments. If Owner makes this election, the Contractor shall arrange for receipt of the EFT/ACH payments.

E.2.2 Contractor shall submit to the Owner an application for each payment and, if required, receipts or other vouchers showing payments for materials and labor including payments to Subcontractors. Contractor shall include in its application for payment a schedule of the percentages of the various parts of the Work completed, based on the Schedule of Values which shall aggregate to the payment application total, and shall include, on the face of each copy thereof, a certificate in substantially the following form:

"I, the undersigned, hereby certify that the above bill is true and correct, and the payment therefore, has not been received.

Signed: \_\_\_\_\_,  
Dated: \_\_\_\_\_,"

E.2.3 Generally, applications for payment will be accepted only for materials that have been installed. Under special conditions, applications for payment for stored materials will be accepted at Owner's sole discretion. Such a payment, if made, will be subject to the following conditions:

(a) The request for stored material shall be submitted at least thirty (30) Days in advance of the application for payment on which it appears. Applications for payment shall be entertained for major equipment, components or expenditures only.

(b) The Contractor shall submit applications for payment showing the quantity and cost of the material stored.

(c) The material shall be stored in a bonded warehouse and Owner shall be granted the right to access the material for the purpose of removal or inspection at any time during the Contract Period.

(d) The Contractor shall name the Owner as co-insured on the insurance policy covering the full value of the property while in the care and custody of the Contractor until it is installed. A certificate noting this coverage shall be issued to the Owner.

(e) Payments shall be made for materials and equipment only. The submitted amount in the application for payment shall be reduced by the cost of transportation from the storage site to the project site and for the cost of an inspector to verify delivery and condition of the goods at the storage site. The cost of storage and inspection shall be borne solely by the Contractor.

(f) Within sixty (60) Days of the application for payment, the Contractor shall submit evidence of payment covering the material and/or equipment stored and of payment for the storage site.

(g) Payment for stored materials and/or equipment shall in no way indicate acceptance of the materials and/or equipment or waive any rights under this Contract for the rejection of the Work or materials and/or equipment not in conformance with the Contract Documents.

(h) All required documentation shall be submitted with the respective application for payment.

E.2.4 The Owner reserves the right to withhold all or part of a payment, or may nullify in whole or part any payment previously made, to such extent as may be necessary in the Owner's opinion to protect the Owner from loss because of:

(a) Work that is defective and not remedied, or that has been demonstrated or identified as failing to conform with Applicable Laws or the Contract Documents,

(b) third party claims filed or evidence reasonably indicating that such claims will likely be filed unless security acceptable to the Owner is provided by the Contractor;

(c) failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment (in which case Owner may issue checks made payable jointly to Contractor and such unpaid persons under this provision, or directly to Subcontractors and suppliers at any level under Section C.3.2.1);

(d) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price;

(e) damage to the Work, Owner or another contractor;

(f) reasonable evidence that the Work will not be completed within the Contract Time required by the Contract, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

(g) failure to carry out the Work in accordance with the Contract Documents; or

(h) assessment of liquidated damages, when withholding is made for offset purposes.

E.2.5 Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

(a) Take that portion of the Contract Price properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the total Contract Price allocated to that portion of the Work in the Schedule of Values, less retainage as provided in Section E.5. Pending final determination of cost to the Owner of changes in the Work, no amounts for changes in the Work can be included in applications for payment until the Contract Price has been adjusted by a Supplement Amendment;

(b) Add that portion of the Contract Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner pursuant to Section E.2.3, suitably stored off the site at a location agreed upon in writing), less retainage as provided in Section E.5;

(c) Subtract the aggregate of previous payments made by the Owner; and

(d) Subtract any amounts for which the Owner has withheld or nullified payment as provided in the Contract Documents.

E.2.6 Contractor's applications for payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay to a Subcontractor or material supplier.

E.2.7 The Contractor warrants to Owner that title to all Work covered by an application for payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an application for payment all Work for which payments are received from the Owner shall be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided financing, labor, materials and equipment relating to the Work.

E.2.8 If Contractor disputes any determination by Owner with regard to any application for payment, Contractor nevertheless shall continue to expeditiously perform the Work. No payment made hereunder shall be or be construed to be final acceptance or approval of that portion of the Work to which such partial payment relates or shall relieve Contractor of any of its obligations hereunder.

E.2.9 Contractor shall submit its initial MWESB Report within ten (10) Days of Contractor's execution of the Contract, or if there will be a Guaranteed Maximum Price (GMP) Amendment, then within ten (10) Days of Contractor's execution of the GMP Amendment. Contractor shall submit annual MWESB Reports on June 30 of each year the Contract is active. Contracts (or GMP Amendments) first executed by Contractor within ninety (90) Days before June 30 of the year of execution by Contractor may at the discretion of Owner be exempt from submitting the annual MWESB Report otherwise due on that June 30. The final MWESB Report shall be filed with the application for final payment. Timely receipt of MWESB Reports by Owner shall be a condition precedent to Owner's obligation to pay any progress payments or final payment otherwise due.

### **E.3 PAYROLL CERTIFICATION REQUIREMENT**

Owner's receipt of payroll certification pursuant to Section C.2 of this Contract shall be a condition precedent to Owner's obligation to pay any progress payments or final payment otherwise due.

### **E.4 DUAL PAYMENT SOURCES**

Contractor shall not be compensated for Work performed under this Contract from any state agency other than the agency that is a party to this Contract.

### **E.5 RETAINAGE**

E.5.1 Retainage shall be withheld and released in accordance with the requirements set forth in OAR 580-063-0045.

E.5.1.1 Owner may reserve as retainage from any progress payment an amount not to exceed five percent of the payment. As Work progresses, Owner may reduce the amount of retainage on or may eliminate retainage on any remaining monthly Contract payments after 50 percent of the Work under the Contract is completed if, in the Owner's discretion, such Work is progressing satisfactorily. Elimination or reduction of retainage shall be allowed only upon written application by the Contractor, which application shall include written approval of Contractor's surety; except that when the Work is 97-1/2 percent completed the Owner may, at its discretion and without application by the Contractor, reduce the retained amount to 100 percent of the value of the Work remaining to

be done. Upon receipt of written application by the Contractor, Owner shall respond in writing within a reasonable time.

E.5.1.2 Contractor may request in writing:

- (a) to be paid amounts which would otherwise have been retained from progress payments where Contractor has deposited acceptable bonds and securities of equal value with Owner or in a custodial account or other mutually-agreed account satisfactory to Owner, with an approved bank or trust company to be held in lieu of the cash retainage for the benefit of Owner;
- (b) for construction projects over \$1,000,000, that retainage be deposited in an interest bearing account, established through the State Treasurer for state agencies, in a bank, savings bank, trust company or savings association for the benefit of Owner, with earnings from such account accruing to the Contractor; or
- (c) that the Owner allow Contractor to deposit a surety bond for the benefit of Owner, in a form acceptable to Owner, in lieu of all or a portion of funds retained, or to be retained. Such bond and any proceeds therefrom shall be made subject to all claims in the manner and priority as set forth for retainage.

When the Owner has accepted the Contractor's election of option (a) or (b), Owner may recover from Contractor any additional costs incurred through such election by reducing Contractor's final payment. Where the Owner has agreed to Contractor's request for option (c), Contractor shall accept like bonds from Subcontractors and suppliers on the project from which Contractor has required retainages.

E. 5.1.3 The retainage held by Owner shall be included in and paid to the Contractor as part of the final payment of the Contract Price. The Owner shall pay to Contractor interest at the rate of two-thirds of one percent per month on the final payment due Contractor, interest to commence forty five (45) Days after the date which Owner receives Contractor's final approved application for payment and Work under the Contract has been completed and accepted and to run until the date when final payment is tendered to Contractor. The Contractor shall notify Owner in writing when the Contractor considers the Work complete and deliver to Owner its final application for payment and Owner shall, within fifteen (15) Days after receiving the written notice and the application for payment, either accept the Work or notify the Contractor of Work yet to be performed on the Contract. If Owner does not within the time allowed notify the Contractor of Work yet to be performed to fulfill contractual obligations, the interest provided by this subsection shall commence to run forty five (45) Days after the end of the 15-Day period.

E.5.1.4 Owner will reduce the amount of the retainage if the Contractor notifies the controller of the Owner that the Contractor has deposited in an escrow account with a bank or trust company, in a manner authorized by the Owner, bonds and securities of equal value of a kind approved by the Owner and such bonds and securities have in fact been deposited.

E.5.1.5 Contractor agrees that if Contractor elects to reserve a retainage from any progress payment due to any Subcontractor or supplier, such retainage shall not exceed five percent of the payment, and such retainage withheld from Subcontractors and suppliers shall be subject to the same terms and conditions stated in Subsection E.5 as apply to Owner's retainage from any progress payment due to Contractor.

## **E.6 FINAL PAYMENT**

- E.6.1 Upon completion of all the Work under this Contract, the Contractor shall notify the Owner, in writing, that Contractor has completed Contractor's obligations under the Contract and shall prepare its application requesting final payment. Upon receipt of such notice and application for payment, the Owner will inspect the Work, and, if acceptable, submit to the Owner a recommendation as to acceptance of the completed Work and the final estimate of the amount due the Contractor. If the Work is not acceptable, Owner will notify Contractor within fifteen (15) Days of Contractor's request for final payment. Upon approval of this final application for payment by the Owner and compliance by the Contractor with provisions in Section K, and Contractor's satisfaction of other provisions of the Contract Documents as may be applicable, the Owner shall pay to the Contractor all monies due under the provisions of these Contract Documents.
- E.6.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Owner (1) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least thirty (30) Days' prior written notice has been given to the Owner, (2) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (3) consent of surety, if any, to final payment and (4), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.
- E.6.3 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final application for payment.
- E.6.4 Contractor agrees to submit its final payment application within ninety (90) Days after Substantial Completion, unless written extension is granted by Owner. Contractor shall not delay final payment application for any reason, including without limitation nonpayment of Subcontractors, suppliers, manufacturers or others not a party to this Contract, or lack of resolution of a dispute with Owner or any other person of matters arising out of or relating to the Contract. If Contractor fails to submit its final payment application within ninety (90) Days after Substantial Completion, and Contractor has not obtained written extension by Owner, all requests or Claims for additional costs or an extension of Contract Time shall be waived.

## **SECTION F JOB SITE CONDITIONS**

### **F.1 USE OF PREMISES**

Contractor shall confine equipment, storage of materials and operation of Work to the limits indicated by Contract Documents, Applicable Laws, permits or directions of the Owner. Contractor shall follow the Owner's instructions regarding use of premises, if any.

### **F.2 PROTECTION OF WORKERS, PROPERTY AND THE PUBLIC**

- F.2.1 Contractor shall maintain continuous and adequate protection of all of the Work from damage and shall protect the Owner, workers and property from injury or loss arising in connection with this Contract. Contractor shall remedy acceptably to the Owner any damage, injury, or loss, except such as may be directly due to errors in the Contract Documents or caused by authorized representatives or personnel of the Owner. Contractor shall adequately protect adjacent property as provided by law and the Contract Documents.
- F.2.2 Contractor shall take all necessary precautions for the safety of all personnel on the job site or otherwise engaged in the undertaking of the Work and shall comply with the Contract Documents, best practices and all applicable provisions of federal, state and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the Work is being performed. Contractor shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards for protection of workers and the public against any hazards created by construction. Contractor shall designate a responsible employee or associate on the Work site, whose duty shall be the prevention of accidents. The name and position of the person designated shall be reported to the Owner. The Owner has no responsibility for Work site safety. Work site safety shall be the responsibility of the Contractor.
- F.2.3 Contractor shall not enter upon private property without first obtaining permission from the property owner or its duly authorized representative. Contractor shall be responsible for the preservation of all public and private property along and adjacent to the Work contemplated under the Contract and shall use every precaution necessary to prevent damage thereto. In the event the Contractor damages any property, the Contractor shall at once notify the property owner and make, or arrange to make, full restitution. Contractor shall, immediately and in writing, report to the Owner, all pertinent facts relating to such property damage and the ultimate disposition of the claim for damage.
- F.2.4 Contractor shall be responsible for protection of adjacent work areas including impacts brought about by activities, equipment, labor, utilities, vehicles and materials on the site.
- F.2.5 Contractor shall at all times direct its activities in such a manner as to minimize adverse effects on the environment. Handling of all materials shall be conducted so no release will occur that may pollute or become hazardous.
- F.2.6 In an emergency affecting the safety of life or limb or of the Work or of adjoining property, the Contractor, without special instruction or authorization from the Owner, shall act reasonably to prevent threatened loss or injury, and shall so act, without appeal, if instructed by the Owner. Any compensation claimed by the Contractor on account of emergency work shall be determined in accordance with section D.

### **F.3 CUTTING AND PATCHING**

- F.3.1 Contractor shall be responsible for coordinating all cutting, fitting, or patching of the Work to make its several parts come together properly and fit to receive or be received by work of other contractors or Subcontractors shown upon, or reasonably implied by, the Contract Documents.
- F.3.2 Contractor shall be responsible for restoring all cut, fitted, or patched surfaces to an original condition; provided, however, that if a different condition is specified in the Contract Documents, then Contractor shall be responsible for restoring such surfaces to the condition specified in the Contract Documents.

#### **F.4 CLEANING UP**

From time to time as may be prudent or ordered by the Owner and, in any event, immediately after completion of the Work, the Contractor shall, at its own expense, clean up and remove all refuse and unused materials of any kind resulting from the Work. If Contractor fails to do so within twenty-four hours after notification by the Owner the work may be done by others and the cost charged to the Contractor and deducted from payment due the Contractor.

#### **F.5 ENVIRONMENTAL CONTAMINATION**

F.5.1. Contractor shall be held responsible for and shall indemnify, defend (with counsel of Owner's choice), and hold harmless Owner from and against any costs, expenses, damages, claims, and causes of action, (including attorney fees), or any of them, resulting from all spills, releases, discharges, leaks and disposal of environmental pollution, including storage, transportation, and handling during the performance of the Work or Contractor's obligations under the Contract which occur as a result of, or are contributed by, the negligence or actions of Contractor or its personnel, agents, or Subcontractors or any failure to perform in accordance with the Contract Documents (except to the extent otherwise void under ORS 30.140). Nothing in this section F.5.1 shall limit Contractor's responsibility for obtaining insurance coverages required under Section G.3 of this Contract, and Contractor shall take no action that would void or impair such coverages.

F.5.1.1 Contractor agrees to promptly dispose of such spills, releases, discharge or leaks to the satisfaction of Owner and regulatory agencies having jurisdiction in a manner that complies with Applicable Laws. Cleanup shall be at no cost to the Owner and shall be performed by properly qualified and, if applicable, licensed personnel.

F.5.1.2 Contractor shall obtain the Owner's written consent prior to bringing onto the Work site any (i) environmental pollutants or (ii) hazardous substances or materials, as the same or reasonably similar terms are used in any Applicable Laws. Notwithstanding such written consent from the Owner, the Contractor, at all times, shall:

- (a) properly handle, use and dispose of all environmental pollutants and hazardous substances or materials brought onto the Work site, in accordance with all Applicable Laws;
- (b) be responsible for any and all spills, releases, discharges, or leaks of (or from) environmental pollutants or hazardous substances or materials which Contractor has brought onto the Work site; and
- (c) promptly clean up and remediate, without cost to the Owner, such spills, releases, discharges, or leaks to the Owner's satisfaction and in compliance with all Applicable Laws.

F.5.2 Contractor shall report all reportable quantity releases, as such releases are defined in Applicable Laws, including but not limited to 40 CFR Part 302, Table 302.4 and in OAR 340-142-0050, to applicable federal, state, and local regulatory and emergency response agencies. Upon discovery, regardless of quantity, Contractor must telephonically report all releases to the Owner. A written follow-up report shall be submitted to Owner within 48 hours of the telephonic report. Such written report shall contain, as a minimum:

- (a) Description of items released (identity, quantity, manifest numbers, and any and all other documentation required by law.)

- (b) Whether amount of items released is EPA/DEQ reportable, and, if so, when reported.
- (c) Exact time and location of release, including a description of the area involved.
- (d) Containment procedures initiated.
- (e) Summary of communications about the release between Contractor and members of the press or State, local or federal officials other than Owner.
- (f) Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.
- (g) Personal injuries, if any, resulting from, or aggravated by, the release.

#### **F.6 ENVIRONMENTAL CLEAN-UP**

F.6.1 Unless disposition of environmental pollution is specifically a part of this Contract, or was caused by the Contractor (reference F.5 Environmental Contamination), Contractor shall immediately notify Owner of any hazardous substance(s) which Contractor discovers or encounters during performance of the Work required by this Contract. "Hazardous substance(s)" means any hazardous, toxic and radioactive materials and those substances defined as "hazardous substances," "hazardous materials," "hazardous wastes," "toxic substances," or other similar designations in any federal, state, or local law, regulation, or ordinance, including without limitation asbestos, polychlorinated biphenyl (PCB), or petroleum, and any substances, materials or wastes regulated by 40 CFR, Part 261 and defined as hazardous in 40 CFR S 261.3. In addition to notifying Owner of any hazardous substance(s) discovered or encountered, Contractor shall immediately cease working in any particular area of the project where a hazardous substance(s) has been discovered or encountered if continued work in such area would present a risk or danger to the health or well being of Contractor's or any Subcontractor's work force, property or the environment.

F.6.2 Upon being notified by Contractor of the presence of hazardous substance(s) on the project site, Owner shall arrange for the proper disposition of such hazardous substance(s).

#### **F.7 FORCE MAJEURE**

A party to this Contract shall not be held responsible for delay or default due to Force Majeure acts, events or occurrences unless they could have been avoided by the exercise of reasonable care, prudence, foresight, and diligence by that party. The Owner may terminate this Contract upon written notice after determining that delay or default caused by Force Majeure acts, events or occurrences will reasonably prevent successful performance of the Contract.

### **SECTION G *INDEMNITY, BONDING, AND INSURANCE***

#### **G.1 RESPONSIBILITY FOR DAMAGES / INDEMNITY**

G.1.1 Contractor shall be responsible for all damage to property, injury to persons, and loss, expense, inconvenience, and delay that may be caused by, or result from, the carrying out of the Work to be done under this Contract, or from any act, omission or neglect of the Contractor, its Subcontractors, employees, guests, visitors, invitees and agents.

G.1.2 To the fullest extent permitted by law, Contractor shall indemnify, defend (with counsel approved by Owner) and hold harmless the Owner, Architect/Engineer, Architect/Engineer's

consultants, and their respective officers, directors, agents, employees, partners, members, stockholders and affiliated companies (collectively "Indemnitees") from and against all liabilities, damages, losses, claims, expenses (including reasonable attorney fees), demands and actions of any nature whatsoever which arise out of, result from or are related to, (a) any damage, injury, loss, expense, inconvenience or delay described in this Section G.1., (b) any accident or occurrence which happens or is alleged to have happened in or about the project site or any place where the Work is being performed, or in the vicinity of either, at any time prior to the time the Work is fully completed in all respects, (c) any failure of the Contractor to observe or perform any duty or obligation under the Contract Documents which is to be observed or performed by the Contractor, or any breach of any agreement, representation or warranty of the Contractor contained in the Contract Documents or in any subcontract, (d) the negligent acts or omissions of the Contractor, a Subcontractor or anyone directly or indirectly employed by them or any one of them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder (except to the extent otherwise void under ORS 30.140), and (e) any lien filed upon the project or bond claim in connection with the Work. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section G.1.2.

G.1.3 In claims against any person or entity indemnified under Section G.1.2 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section G.1.2 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

## **G.2 PERFORMANCE AND PAYMENT SECURITY; PUBLIC WORKS BOND**

G.2.1 When the Contract Price is \$100,000 or more (or \$50,000 or more in the case of Contracts for highways, bridges and other transportation projects), the Contractor shall furnish and maintain in effect at all times during the Contract Period a performance bond in a sum equal to the Contract Price and a separate payment bond also in a sum equal to the Contract Price. Contractor shall furnish such bonds even if the Contract Price is less than the above thresholds if otherwise required by the Contract Documents.

G.2.2 Bond forms furnished by the Owner and notarized by awarded Contractor's surety company authorized to do business in Oregon are the only acceptable forms of performance and payment security, unless otherwise specified in the Contract Documents.

G.2.3 Before execution of the Contract the Contractor shall file with the Construction Contractors Board, and maintain in full force and effect, the separate public works bond required by Oregon Laws 2005, Chapter 360, and OAR 839-025-0015, unless otherwise exempt under those provisions. The Contractor shall also include in every subcontract a provision requiring the Subcontractor to have a public works bond filed with the Construction Contractors Board before starting Work, unless otherwise exempt, and shall verify that the Subcontractor has filed a public works bond before permitting any Subcontractor to start Work.

## **G.3 INSURANCE**

G.3.1 Primary Coverage: Insurance carried by Contractor under this Contract shall be the primary coverage. The coverages indicated are minimums unless otherwise specified in the Contract Documents.

G.3.2 Workers' Compensation: 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. This shall include Employer's Liability Insurance with coverage limits of not less than the minimum amount required by statute for each accident. Contractors who perform the Work without the assistance or labor of any employee need not obtain such coverage if the Contractor certifies so in writing. Contractor shall ensure that each of its Subcontractors complies with these requirements. The Contractor shall require proof of such Workers' Compensation coverage by receiving and keeping on file a certificate of insurance from each Subcontractor or anyone else directly employed by either the Contractor or its Subcontractors.

G.3.3 Builder's Risk Insurance:

G.3.3.1 Builder's Risk: During the term of this Contract, for new construction the Contractor shall obtain and keep in effect Builder's Risk insurance on an all risk forms, including earthquake and flood, for an amount equal to the full amount of the Contract, plus any changes in values due to modifications, Change Orders and loss of materials added. Such Builder's Risk shall include, in addition to earthquake and flood, theft, vandalism, mischief, collapse, transit, debris removal, and architect's fees "soft costs" associated with delay of project due to insured peril. Any deductible shall not exceed \$50,000 for each loss, except the earthquake and flood deductible which shall not exceed 2 percent of each loss or \$50,000, whichever is greater. The deductible shall be paid by Contractor if Contractor is negligent. The policy will include as loss payees Owner, the Contractor and its Subcontractors as their interests may appear.

G.3.3.2 Builder's Risk Installation Floater: For Work other than new construction, Contractor shall obtain and keep in effect during the term of this Contract, a Builder's Risk Installation Floater for coverage of the Contractor's labor, materials and equipment to be used for completion of the Work performed under this Contract. The minimum amount of coverage to be carried shall be equal to the full amount of the Contract. The policy will include as loss payees Owner, the Contractor and its Subcontractors as their interests may appear. Owner may waive this requirement at their sole and absolute discretion.

G.3.3.3 Such insurance shall be maintained until Owner has occupied the facility.

G.3.3.4 A loss insured under the Builder's Risk insurance shall be adjusted by the Owner and made payable to the Owner as loss payee. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner. The Owner shall have power to adjust and settle a loss with insurers.

G.3.4 General Liability Insurance:

G.3.4.1 Commercial General Liability: Upon issuance of a Supplement, Contractor shall obtain, and keep in effect at Contractor's expense for the term of the Supplement, Commercial General Liability Insurance covering bodily injury and property damage in the amount of \$1,000,000 per claim and \$2,000,000 per occurrence in a form satisfactory to Owner. This insurance shall include personal injury liability, products and completed operations, and contractual liability coverage for the



indemnities provided under this Contract (to the extent contractual liability coverage for the indemnity is available in the marketplace), and shall be issued on an occurrence basis.

- G.3.4.2 Automobile Liability: Contractor shall obtain, at Contractor's expense, and keep in effect during the term of this Contract, Automobile Liability Insurance covering owned, and/or hired vehicles, as applicable. The coverage may be written in combination with the Commercial General Liability Insurance. Contractor shall provide proof of insurance of not less than \$1,000,000 per claim and \$2,000,000 per occurrence. Contractor and its Subcontractors shall be responsible for ensuring that all non-owned vehicles maintain adequate Automobile Liability insurance while on site.
- G.3.4.3 Owner may adjust the insurance amounts required in Section G.3.4.1 and G.3.4.2 based upon institution specific risk assessments through the issuance of Supplemental General Conditions and a Supplement.
- G.3.4.4 "Tail" Coverage: If any of the required liability insurance is arranged on a "claims made" basis, "tail" coverage will be required at the completion of this Contract for a duration of 36 months or the maximum time period available in the marketplace if less than 36 months. Contractor shall furnish certification of "tail" coverage as described or continuous "claims made" liability coverage for 36 months following Final Completion. Continuous "claims made" coverage will be acceptable in lieu of "tail" coverage, provided its retroactive date is on or before the effective date of this Contract. Owner's receipt of the policy endorsement evidencing such coverage shall be a condition precedent to Owner's obligation to make final payment and to Owner's final acceptance of Work or services and related warranty (if any).
- G.3.4.5: Umbrella Liability (if required by Owner through issuance of Supplemental General Conditions): Contractor shall obtain, at Contractor's expense, and keep in effect during the term of this Contract, Umbrella liability Insurance over and above the general liability, automobile liability and workers' compensation coverage if required by Owner in specified limits at time of requirement.
- G.3.4.6 Pollution Liability (if required by Owner through issuance of Supplemental General Conditions): Contractor shall obtain, at Contractor's expense, and keep in effect during the term of this Contract, Pollution liability Insurance in minimum amounts of \$3,000,000 naming Owner as "additional insured," as noted in the "additional insured section below.
- G.3.5 Additional Insured: The general liability insurance coverage, professional liability, umbrella, and pollution liability if required, shall include the Owner as additional insureds but only with respect to the Contractor's activities to be performed under this Contract.
- If Contractor cannot obtain an insurer to name the Owner as additional insureds, Contractor shall obtain at Contractor's expense, and keep in effect during the term of this Contract, Owners and Contractors Protective Liability Insurance, naming the Owner as additional insureds with not less than a \$2,000,000 limit per occurrence. This policy must be kept in effect for 36 months following Final Completion. As evidence of coverage, Contractor shall furnish the actual policy to Owner prior to execution of the Contract.
- G.3.6 Notice of Cancellation or Change: If the Contractor receives a non-renewal or cancellation notice from an insurance carrier affording coverage required herein, or receives notice that coverage no longer complies with the insurance requirements herein, Contractor agrees to notify Owner by fax within five (5) business days with a copy of the non-renewal or cancellation notice, or written specifics as to which coverage is

no longer in compliance. When notified by Owner, the Contractor agrees to stop Work pursuant to this Contract, unless all required insurance remain in effect. Any failure to comply with the reporting provisions of this insurance, except for the potential exhaustion of aggregate limits, shall not affect the coverages provided to the Owner and its institutions, divisions, officers, and employees.

Owner shall have the right, but not the obligation, of prohibiting Contractor from entering the Work site until a new certificate(s) of insurance is provided to Owner evidencing the replacement coverage. The Contractor agrees Owner reserves the right to withhold payment to Contract until evidence of reinstated or replacement coverage is provided to Owner.

- G.3.7 Certificate(s) of Insurance: As evidence of the insurance coverage required by this Contract, the Contractor shall furnish certificate(s) of insurance to the Owner prior to execution of the Contract. The certificate(s) will specify all of the parties who are additional insureds or loss payees for this contract. Insurance coverage required under this Contract shall be obtained from insurance companies or entities acceptable to the Owner and that are eligible to provide such insurance under Oregon law. Eligible insurers include admitted insurers that have been issued a certificate of authority from the Oregon Department of Consumer and Business Services authorizing them to conduct an insurance business and issue policies of insurance in the state of Oregon, and certain non-admitted surplus lines insurers that satisfy the requirements of applicable Oregon law and which are subject to approval by the Owner. The Contractor shall be financially responsible for all deductibles, self-insured retentions and/or self-insurance included hereunder. Any deductible, self-insured retention and/or self-insurance in excess of \$50,000 shall be subject to approval by the Owner in writing and shall be a condition precedent to the effectiveness of any Supplement.
- G.3.8 Retainer Contract Program: For the OUS Retainer Contract Program the term "Contract" as used in this Section G in the phrases "keep in effect during the term of this Contract" and "prior to execution of the Contract" shall mean each Retainer Contract Supplement issued under the Retainer Contract.

## **SECTION H SCHEDULE OF WORK**

### **H.1 CONTRACT PERIOD**

- H.1.1 Time is of the essence. The Contractor shall at all times carry on the Work diligently, without delay and punctually fulfill all requirements herein. If required by the Contract Documents, Contractor shall commence Work on the site within fifteen (15) Days of Notice to Proceed, unless directed otherwise.
- H.1.2 Unless specifically extended by Supplement Amendment, all Work shall be complete by the date contained in the Contract Documents. The Owner shall have the right to accelerate the completion date of the Work, which may require the use of overtime. Such accelerated Work schedule shall be an acceleration in performance of Work under Section D.1.2 (f) and shall be subject to the provisions of Section D.1.
- H.1.3 The Owner shall not waive any rights under the Contract by permitting the Contractor to continue or complete in whole or in part the Work after the date described in Section H.1.2 above.

### **H.2 SCHEDULE**

- H.2.1 Contractor shall provide, by or before the pre-construction conference, the initial as-planned schedule for review and acceptance by the Owner. The submitted schedule must illustrate Work by project components, labor trades, and long

lead items broken down by building and/or floor where applicable. If Owner shall so elect, Contractor shall provide the schedule in CPM format showing the graphical network of planned activities, including i) a reasonably detailed list of all activities required to complete the Work; ii) the time and duration that each activity will take to completion; and iii) the dependencies between the activities. Schedules lacking adequate detail, or unreasonably detailed, will be rejected. The schedule shall include the following: Notice to Proceed or the date the Work commences, if no Notice to Proceed is issued by Owner, Substantial Completion, and Final Completion. Schedules shall be updated monthly, unless otherwise required by the Contract Documents, and submitted with the monthly application for payment. Acceptance of the Schedule by the Owner does not constitute agreement by the Owner as to the Contractor's sequencing, means, methods, or durations. Any positive difference between the Contractor's scheduled completion and the Contract completion date is float owned by the Owner. Owner reserves the right to negotiate the float if it is deemed to be in Owner's best interest to do so. In no case shall the Contractor make a claim for delays if the Work is completed within the Contract Time but after Contractor's scheduled completion.

### **H.3 PARTIAL OCCUPANCY OR USE**

H.3.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage, provided such occupancy or use is consented to by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have reasonably accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, insurance or self-insurance, maintenance, heat, utilities, and damage to the Work, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents with respect to such portion of the Work. Approval by the Contractor to partial occupancy or use shall not be unreasonably withheld. Immediately prior to such partial occupancy or use, the Owner and Contractor shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

## **SECTION I CORRECTION OF WORK**

### **I.1 CORRECTION OF WORK BEFORE FINAL PAYMENT**

The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects, and that the Work will conform to the requirements of the Contract Documents. Work failing to conform to these requirements shall be deemed defective. Contractor shall promptly remove from the premises and replace all defective materials and equipment as determined by the Owner, whether incorporated in the Work or not. Removal and replacement shall be without loss or expense to the Owner, and Contractor shall bear the cost of repairing all Work destroyed or damaged by such removal or replacement. Contractor shall be allowed a period of no longer than thirty (30) Days after Substantial Completion for completion of defective (Punch List) work. At the end of the thirty-day period, or earlier if requested by the Contractor, Owner shall arrange for inspection of the Work by the Architect/Engineer. Should the work not be complete, and all corrections made, the costs for all subsequent reinspections shall be borne by the Contractor. If Contractor fails to complete the Punch List work within the thirty (30) Day period, Owner may perform such work and Contractor shall reimburse Owner all costs

of the same within ten (10) Days after demand without affecting Contractor's obligations.

### **I.2 WARRANTY WORK**

- I.2.1 Neither the final certificate of payment nor any provision of the Contract Documents shall relieve the Contractor from responsibility for defective Work and, unless a longer period is specified, Contractor shall correct all defects that appear in the Work within a period of one year from the date of issuance of the written notice of Substantial Completion by the Owner except for latent defects which will be remedied by the Contractor at any time they become apparent. The Owner shall give Contractor notice of defects with reasonable promptness. Contractor shall perform such warranty work within a reasonable time after Owner's demand. If Contractor fails to complete the warranty work within such period as Owner determines reasonable, or at any time in the event of warranty work consisting of emergency repairs, Owner may perform such work and Contractor shall reimburse Owner all costs of the same within ten (10) Days after demand, without affecting Contractor's obligations. The Contractor shall perform the warranty Work by correcting defects within twenty-four (24) hours of notification by Owner, unless otherwise specified in the Contract Documents. Should the Contractor fail to respond within the specified response time, the Owner may, at its option, complete the necessary repairs using another contractor or its own forces. If Owner completes the repairs using Owner's own forces, Contractor shall pay Owner at the rate of one and one-half (1½) times the standard hourly rate of Owner's forces, plus related overhead and any direct non-salary costs. If Owner completes the repairs using another contractor, Contractor shall pay Owner the amount of Owner's direct costs billed by the other contractor for the work, plus the direct salary costs and related overhead and direct non-salary expenses of Owner's forces who are required to monitor that contractor's work. Work performed by Owner using Owner's own forces or those of another contractor shall not affect the Contractor's contractual duties under these provisions, including warranty provisions.
- I.2.2 Nothing in this Section I.2 provision shall negate guarantees or warranties for periods longer than one year including without limitation such guarantees or warranties required by other sections of the Contract Documents for specific installations, materials, processes, equipment or fixtures.
- I.2.3 In addition to Contractor's warranty, manufacturer's warranties shall pass to the Owner and shall not take effect until such portion of the Work covered by the applicable warranty has been accepted in writing by the Owner.
- I.2.4 The one-year period for correction of Work shall be extended with respect to portions of Work performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work, and shall be extended by corrective Work performed by the Contractor pursuant to this Section, as to the Work corrected. The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.
- I.2.5 Nothing contained in this Section I.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the period for correction of Work as described in this Section I.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

I.2.6 If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Price will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

## **SECTION J**

### ***SUSPENSION AND/OR TERMINATION OF THE WORK***

#### **J.1 OWNER'S RIGHT TO SUSPEND THE WORK**

J.1.1 The Owner has the authority to suspend portions or all of the Work due to the following causes:

- (a) Failure of the Contractor to correct unsafe conditions;
- (b) Failure of the Contractor to carry out any provision of the Contract;
- (c) Failure of the Contractor to carry out orders;
- (d) Conditions, in the opinion of the Owner, which are unsuitable for performing the Work;
- (e) Time required to investigate differing site conditions;
- (f) Any reason considered to be in the public interest.

J.1.2 The Owner shall notify Contractor and the Contractor's Surety in writing of the effective date and time of the suspension, and Owner shall notify Contractor and Contractor's surety in writing to resume Work.

#### **J.2 CONTRACTOR'S RESPONSIBILITIES**

J.2.1 During the period of the suspension, Contractor is responsible to continue maintenance at the project just as if the Work were in progress. This includes, but is not limited to, protection of completed Work, maintenance of access, protection of stored materials, temporary facilities, and clean-up.

J.2.2 When the Work is recommenced after the suspension, the Contractor shall replace or renew any Work damaged during the suspension, remove any materials or facilities used as part of temporary maintenance, and complete the project in every respect as though its prosecution had been continuous and without suspension.

#### **J.3 COMPENSATION FOR SUSPENSION**

J.3.1 Depending on the reason for suspension of the Work, the Contractor or the Owner may be due compensation by the other party. If the suspension was required due to acts or omissions of Contractor, the Owner may assess the Contractor actual costs of the suspension in terms of administration, remedial work by the Owner's forces or another contractor to correct the problem associated with the suspension, rent of temporary facilities, and other actual costs related to the suspension. If the suspension was caused by acts or omissions of the Owner, the Contractor may be due compensation which shall be defined using Section D, Changes in Work. If the suspension was required through no fault of the Contractor or the Owner, neither party shall owe the other for the impact.

#### **J.4 OWNER'S RIGHT TO TERMINATE CONTRACT**

J.4.1 The Owner may, without prejudice to any other right or remedy, and after giving Contractor seven (7) Days' written notice and an opportunity to cure, terminate the Contract in whole or in part under the following conditions:

- (a) If Contractor should, voluntarily or involuntarily, seek protection under the United States Bankruptcy Code and Contractor as debtor-in-possession or the Trustee for the estate fails to assume the Contract within a reasonable time;
- (b) If Contractor should make a general assignment for the benefit of Contractor's creditors;
- (c) If a receiver should be appointed on account of Contractor's insolvency;
- (d) If Contractor should repeatedly refuse or fail to supply an adequate number of skilled workers or proper materials to carry on the Work as required by the Contract Documents, or otherwise fail to perform the Work in a timely manner;
- (e) If Contractor should repeatedly fail to make prompt payment to Subcontractors or for material or labor, or should disregard laws, ordinances or the instructions of the Owner; or
- (f) If Contractor is otherwise in breach of any part of the Contract.
- (g) If Contractor is in violation of Applicable Laws, either in the conduct of its business or in its performance of the Work.

J.4.2 At any time that any of the above occurs, Owner may exercise all rights and remedies available to Owner at law or in equity, and, in addition, Owner may take possession of the premises and of all materials and appliances and finish the Work by whatever method it may deem expedient. In such case, the Contractor shall not be entitled to receive further payment until the Work is completed. If the Owner's cost of finishing the Work exceeds the unpaid balance of the Contract Price, Contractor shall pay the difference to the Owner.

#### **J.5 TERMINATION FOR CONVENIENCE**

J.5.1 Owner may terminate the Contract in whole or in part whenever Owner determines that termination of the Contract is in the best interest of Owner or the public.

J.5.2 The Owner shall provide the Contractor with seven (7) Days prior written notice of a termination for Owner's or for public convenience. After such notice, the Contractor shall provide the Owner with immediate and peaceful possession of the premises and materials located on and off the premises for which the Contractor received progress payment under Section E. Compensation for Work terminated by the Owner under this provision will be according to Section E. In no circumstance shall Contractor be entitled to lost profits for Work not performed due to termination.

#### **J.6 ACTION UPON TERMINATION**

J.6.1 Upon receiving a notice of termination, and except as directed otherwise by the Owner, Contractor shall immediately cease placing further subcontracts or orders for materials, services, or facilities. In addition, Contractor shall terminate all subcontracts or orders to the extent they relate to the Work terminated and, with the prior written approval of the Owner, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts and orders.

J.6.2 As directed by the Owner, Contractor shall, upon termination, transfer title and deliver to the Owner all Record Documents, information, and other property that, if the Contract had been completed, would have been required to be furnished to the Owner.

I.6.3 Upon Owner's notice of termination pursuant to either Section J.4 or J.5, if Owner shall so elect, Contractor shall assign the Owner such subcontracts and orders as Owner shall specify. In the event Owner elects to take assignment of any such subcontract or order, Contractor shall take such action and shall execute such documents as Owner shall reasonably require for the effectiveness of such assignment and Contractor shall ensure that no contractual arrangement between it and its subcontractors or suppliers of any tier or sub-tier shall prevent such assignment.

## **SECTION K CONTRACT CLOSE OUT**

### **K.1 RECORD DOCUMENTS**

As a condition of final payment (refer also to section E.6), Contractor shall comply with the following: Contractor shall provide Record Documents for the entire project to Owner. Record Documents shall depict the project as constructed and shall reflect each and every change, modification, and deletion made during the construction. Record Documents are part of the Work and shall be provided prior to the Owner's issuance of final payment. Record Documents include all modifications to the Contract Documents unless otherwise directed, and accurate MWESB Reports.

### **K.2 OPERATION AND MAINTENANCE MANUALS**

As part of the Work, Contractor shall submit two completed operation and maintenance manuals ("O & M Manuals") for review by the Owner prior to submission of any pay request for more than 75% of the Work. Owner's receipt of the O & M Manuals shall be a condition precedent to any payment thereafter due. The O & M Manuals shall contain a complete set of all submittals, all product data as required by the specifications, training information, telephone list and contact information for all consultants, manufacturers, installer and suppliers, manufacturer's printed data, record and shop drawings, schematic diagrams of systems, appropriate equipment indices, warranties and bonds. The Owner shall review and return one O & M Manual for any modifications or adjustments required. Prior to submission of its final pay request, Contractor shall deliver three (3) complete and approved sets of O & M Manuals to the Owner and Owner's receipt of the O & M Manuals shall be a condition precedent to Owner's obligation to make final payment.

### **K.3 COMPLETION NOTICES**

K.3.1 Contractor shall provide Owner written notice of both Substantial and Final Completion. The certificate of Substantial Completion shall state the date of Substantial Completion, the responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and the time within which the Contractor shall finish all items on the Punch List accompanying the Certificate. Both completion notices must be signed by the Contractor and the Owner to be valid. The Owner shall provide the final signature on the notices. The notices shall take effect on the date they are signed by the Owner.

K.3.2 Substantial Completion of a facility with operating systems (e.g., mechanical, electrical, HVAC) shall be that degree of completion that has provided a minimum of thirty (30) continuous Days of successful, trouble-free operation, which period shall begin after all performance and acceptance testing has been successfully demonstrated to the Owner. All equipment contained in the Work, plus all other components necessary to enable the Owner to operate the facility in the manner that was intended, shall be complete on the Substantial Completion date. The Contractor may request that a Punch List be prepared by the Owner with submission of the request for the Substantial Completion notice.

### **K.4 TRAINING**

As part of the Work, and prior to submission of the final application for payment, the Contractor shall schedule with the Owner training sessions for all equipment and systems as required by the Contract Documents. Contractor shall schedule training sessions at least two weeks in advance of the date of training to allow Owner to provide its personnel with adequate notice. The O & M Manual shall be used as a basis for training. Training shall be a formal session held after the equipment and/or system is completely installed and operational in its normal operating environment.

### **K.5 EXTRA MATERIALS**

As part of the Work, Contractor shall provide spare parts, extra maintenance materials, and other materials or products in the quantities specified in the Contract Documents prior to final payment. Delivery point for extra materials shall be designated by the Owner.

### **K.6 ENVIRONMENTAL CLEAN-UP**

As part of the Final Completion notice, or as a separate written notice submitted with or before the notice of Final Completion, the Contractor shall notify the Owner that all environmental and pollution clean-up, remediation and closure have been completed in accordance with all Applicable Laws and pursuant to the authority of all agencies having jurisdiction, and Contractor shall provide Owner with any and all documentation related to the same, including but not limited to directives, orders, letters, certificates and permits related to or arising from such environmental pollution. The notice shall reaffirm the indemnification given under Section F.5.1 above. Contractor's completion of its obligations under this Section K.6 and Owner's receipt of documents evidencing such completion shall be a condition precedent to Owner's obligation to make final payment.

### **K.7 CERTIFICATE OF OCCUPANCY**

Owner's receipt of an unconditioned certificate of occupancy from the appropriate state and/or local building officials shall be a condition precedent to Owner's obligation to make final payment, except to the extent failure to obtain an unconditional certificate of occupancy is due to the fault or neglect of Owner.

### **K.8 OTHER CONTRACTOR RESPONSIBILITIES**

The Contractor shall be responsible for returning to the Owner all property of Owner issued to Contractor during construction such as keys, security passes, site admittance badges, and all other pertinent items. Upon notice from Owner, Contractor shall be responsible for notifying the appropriate utility companies to transfer utility charges from the Contractor to the Owner. The utility transfer date shall not be before Substantial Completion and may not be until Final Completion, if the Owner does not take beneficial use of the facility and the Contractor's forces continue with the Work.

### **K.9 SURVIVAL**

All warranty and indemnification provisions of this Contract, and all of Contractor's other obligations under this Contract that are not fully performed by the time of Final Completion or termination, shall survive Final Completion or any termination of the Contract.

**OREGON UNIVERSITY SYSTEM**  
**STANDARD PUBLIC IMPROVEMENT CONTRACT**  
**PERFORMANCE BOND**

Bond No. \_\_\_\_\_  
Solicitation \_\_\_\_\_  
Project Name \_\_\_\_\_

_____ (Surety #1)	Bond Amount No. 1:	\$ _____
_____ (Surety #2)*	Bond Amount No. 2:*	\$ _____
<i>* If using multiple sureties</i>	Total Penal Sum of Bond:	\$ _____

We, \_\_\_\_\_ as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto the State of Oregon, acting by and through the State Board of Higher Education, on behalf of the OUS (OUS), the sum of (Total Penal Sum of Bond)

\_\_\_\_\_ (Provided, that we the Sureties bind ourselves in such sum “jointly and severally” as well as “severally” only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety), and

WHEREAS, the Principal has entered into a contract with the OUS, the plans, specifications, terms and conditions of which are contained in the above-referenced Solicitation;

WHEREAS, the terms and conditions of the contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of contract prices, are made a part of this Performance Bond by reference, whether or not attached to the contract (all hereafter called “Contract”); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and all authorized modifications of the Contract which increase the amount of the work, the amount of the Contract, or constitute an authorized extension of the time for performance, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal herein shall faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, and shall well and truly and fully do and perform all matters and things undertaken by Contractor to be performed under the Contract, upon the terms set forth therein,

and within the time prescribed therein, or as extended as provided in the Contract, with or without notice to the Sureties, and shall indemnify and save harmless the OUS, and \_\_\_\_\_ (name of institution and any other Owner agency), and members thereof, its officers, employees and agents, against any direct or indirect damages or claim of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by the Principal or its subcontractors, and shall in all respects perform said contract according to law, then this obligation is to be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond, nor shall the State of Oregon or the OUS, be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapters 279C and 351, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

**PRINCIPAL:** \_\_\_\_\_

By \_\_\_\_\_  
Signature

\_\_\_\_\_  
Official Capacity  
Attest: \_\_\_\_\_  
Corporation Secretary

**SURETY:** \_\_\_\_\_  
*[Add signatures for each surety if using multiple bonds]*

**BY ATTORNEY-IN-FACT:**  
*[Power-of-Attorney must accompany each surety bond]*

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
City State Zip

\_\_\_\_\_  
Phone Fax

**RETAINER CONTRACT SUPPLEMENT  
OUS RETAINER CONTRACT FOR CONSTRUCTION  
RELATED SERVICES**

Supplement No.  
Project Name  
Owner's Project  
Manager

This Retainer Contract Supplement dated \_\_\_\_\_ (the "Supplement") is entered into between:

"Contractor":

Federal Tax ID No.

and "Owner":

The State of Oregon, acting by and through the State  
Board of Higher Education, on behalf of:

(collectively, the "Parties") pursuant to the Retainer Contract for Construction Related Services between the Parties terminating June 30, 2014 (the "Retainer Contract"). Capitalized terms have the meaning defined in the OUS Retainer General Conditions unless otherwise defined in the Retainer Contract or herein.

**1. DESCRIPTION OF THE PROJECT.** The project to which this Supplement pertains is described as follows: \_\_\_\_\_ (the "Project").

**2. WORK TO BE PERFORMED.** Contractor shall perform the following work on the Project : \_\_\_\_\_ (the "Work"). Contractor will perform the Work according to the terms and conditions of this Supplement and the Contract Documents, which are incorporated herein by this reference.

**3. SCHEDULE.** Contractor shall perform the Work according to the following schedule: \_\_\_\_\_ (the "Schedule").

**4. COMPENSATION.** Owner shall compensate Contractor for Work  (a) in the firm, fixed-price amount of \$ \_\_\_\_\_; or  (b) on a time and materials basis subject to a maximum not-to-exceed price of \$ \_\_\_\_\_; in accordance with the requirements of the OUS Retainer General Conditions. If the Work is performed on a time and materials basis, Contractor's listing of wage rates, material unit costs and overhead charges for the Work is attached to this Supplement.

The cost of the Work under this Supplement, even if this Supplement is later amended to include additional work, must not exceed the greater of \$1,000,000 or the maximum allowable under

OAR 580-063-0030.

**5. TERM.** This Supplement is effective on the date it has been signed by every Party hereto and all approvals required by Applicable Law have been obtained (the “Effective Date”). No Work shall be performed or payment made prior to the Effective Date. Contractor shall perform its obligations in accordance with the Contract Documents, unless this Supplement is earlier terminated or suspended.

**6. PERFORMANCE AND PAYMENT BONDS.** The performance and payment bond requirements for this Project are as follows (check one of the following):

As a condition precedent to the effectiveness of this Supplement and to Owner’s obligation to make payment for the Work, Contractor shall provide the Owner with a performance bond and a separate payment bond in a sum equal to the Contract Price stated in Section 4 of this Supplement.

This Project has a Contract price of \$100,000 or less, and Owner has determined that performance and payment bonds will not be required for this Project.

**7. MINIMUM WAGE RATES.**

Prevailing Wage Rates requirements do not apply to this Project because the maximum compensation for all Owner-contracted Work does not exceed \$50,000.

Prevailing Wage Rates requirements apply to this Project because the maximum compensation for all Owner-contracted Work is more than \$50,000. Contractor and all subcontractors shall comply with the provisions of ORS 279C.800 through 279C.870, relative to Prevailing Wage Rates and the required public works bond, as outlined in Sections C.1, C.2 and G.2.3 of the OUS Retainer General Conditions. The Bureau of Labor and Industries (BOLI) wage rates and requirements set forth in the following BOLI booklet (and any listed amendments to that booklet), which are incorporated herein by reference, apply to the Work authorized under this Supplement:

PREVAILING WAGE RATES for Public Works Contracts in Oregon, \_\_\_\_\_, 20\_\_\_\_, as amended \_\_\_\_\_, 20\_\_\_\_ [~~delete “as amended \_\_\_\_\_, 20\_\_\_\_” if there have been no amendments since last rate change~~], which can be downloaded at the following web address:

[[http://www.boli.state.or.us/BOLI/WHD/PWR/pwr\\_book.shtml](http://www.boli.state.or.us/BOLI/WHD/PWR/pwr_book.shtml)]

The Work will take place in \_\_\_\_\_ County, Oregon.

**8. TAX COMPLIANCE CERTIFICATION.** Contractor hereby certifies and affirms, under penalty of perjury as provided in ORS 305.385(6), that, to the best of Contractor’s knowledge, Contractor is not in violation of any of the tax laws described in ORS 305.380(4). For purposes of this certification, “tax laws” means a state tax imposed by ORS 320.005 to 320.150 and 403.200 to 403.250, ORS Chapters 118, 314, 316, 317, 318, 321 and 323; the elderly rental assistance program under ORS 310.630 to 310.706; and local taxes administered by the Oregon Department of Revenue under ORS 305.620.



**9. INSURANCE REQUIREMENTS.**

Contractor shall comply with and obtain the insurance coverage amounts stated in the OUS Retainer General Conditions.

The Owner has determined that the Contractor shall obtain insurance in the amount described in the Retainer Supplemental General Conditions, attached hereto.

**10. KEY PERSONS.**  If checked here, the following provision is incorporated into this Supplement:

The Parties agree that certain Contractor personnel are specifically valuable to the Project (“Key Persons”). Key Persons shall not be replaced during the Project without the written consent of Owner, which shall not be unreasonably withheld. If Contractor intends to substitute personnel, Owner shall receive the request at least 15 days prior to the effective date of substitution. When replacements have been approved by Owner, Contractor shall provide a transition period of at least 10 working days during which the original and replacement personnel shall be working on the Project concurrently. Upon authorization for the replacement of a Key Person, all subsequent substitutions of that Key Person shall require Owner’s written consent in accordance with this Section. The Key Persons for this Project are the following:

**Project Executive:** \_\_\_\_\_ shall be Contractor’s Project Executive, and will provide oversight and guidance throughout the Project term.

**Project Manager:** \_\_\_\_\_ shall be Contractor’s Project Manager and will participate in all meetings throughout the Project term.

**Job Superintendent:** \_\_\_\_\_ shall be Contractor’s on-site Job Superintendent throughout the Project term.

**Project Engineer:** \_\_\_\_\_ shall be Contractor’s Project Engineer, providing assistance to the Project Manager, and subcontractor and supplier coordination throughout the Project term.

**11. OTHER TERMS.** Except as specifically modified by this Supplement, all terms of the Retainer Contract remain unchanged.

**12. EXECUTION AND COUNTERPARTS.** This Supplement may be executed in several counterparts, each of which shall be an original, all of which shall constitute but one and the same instrument.

**Contractor hereby confirms and certifies that the representations, warranties, and certifications contained in the Retainer Contract remain true and correct as of the Effective Date of this Supplement.**

IN WITNESS HEREOF, the Parties have duly executed this Supplement as of the dates indicated below.

, Contractor

The State of Oregon, acting by and through

the State Board of Higher Education, on  
behalf of \_\_\_\_\_, Owner

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

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

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

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

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

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

**RETAINER CONTRACT SUPPLEMENT AMENDMENT  
OUS RETAINER CONTRACT FOR CONSTRUCTION  
RELATED SERVICES**

Supplement No.:  
Amendment No.:  
Project Name:

This Amendment dated \_\_\_\_\_ to the Retainer Contract Supplement is entered into between:

“Contractor”:

Federal Tax ID No.

and “Owner”:  
The State of Oregon, acting by and through the State  
Board of Higher Education, on behalf of:

(collectively the “Parties”) pursuant to the Retainer Contract for Construction Related Services between the Parties expiring June 30, 2014 (the “Retainer Contract”). Capitalized terms have the meaning defined in the OUS Retainer General Conditions unless otherwise defined in the Contract Documents.

**1. SERVICES:** The Work described in the Retainer Contract Supplement is being amended as follows: \_\_\_\_\_.

**2. SCHEDULE.** The schedule contained in Section 3 of the Retainer Contract Supplement is hereby replaced in its entirety with the following schedule: \_\_\_\_\_.

**3. COMPENSATION.** Section 4 of the Retainer Contract Supplement, is hereby replaced in its entirety with the following:

“Owner will compensate Contractor for Work  (a) in the firm, fixed-price amount of \$ \_\_\_\_\_ ; or  (b) on a time and materials basis subject to a maximum not-to-exceed price of \$ \_\_\_\_\_; in accordance with the requirements of the OUS Retainer General Conditions. If the Project is done on a time and materials basis, Contractor’s listing of wage rates, material unit costs and overhead charges for the Work is attached to this Supplement.

The total cost of Work including the original amount contemplated in the Supplement and the additional amount contemplated in this Amendment, must not exceed the greater of \$1,000,000 or the maximum allowable under OAR 580-063-0030.”

**4. TERM.** This Amendment is effective on the date it has been executed by the Parties and all required approvals have been obtained (the “Effective Date”). No Work will be performed or payment made prior to the Effective Date.

**5. TAX COMPLIANCE CERTIFICATION.** Contractor hereby certifies and affirms, under penalty of perjury as provided in ORS 305.385(6), that, to the best of Contractor’s knowledge, Contractor is not in violation of any of the tax laws described in ORS 305.380(4). For purposes of this certification, “tax laws” means a state tax imposed by ORS 320.005 to 320.150 and 403.200 to 403.250, ORS Chapters 118, 314, 316, 317, 318, 321 and 323; the elderly rental assistance program under ORS 310.630 to 310.706; and local taxes administered by the Oregon Department of Revenue under ORS 305.620.

**6. EXECUTION AND COUNTERPARTS.** This Amendment may be executed in several counterparts, each of which shall be an original, all of which shall constitute but one and the same instrument.

**Contractor hereby confirms and certifies that the representations, warranties and certifications contained in the Retainer Contract and the Retainer Contract Supplement remain true and correct as of the Effective Date of this Amendment.**

IN WITNESS HEREOF, the Parties have duly executed this Amendment as of the dates indicated below.

\_\_\_\_\_, Contractor

The State of Oregon, acting by and through  
the State Board of Higher Education, on  
behalf of \_\_\_\_\_, Owner

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

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

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

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

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

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

# PREVAILING WAGE RATES

for

## Public Works Contracts in Oregon



**OREGON BUREAU OF LABOR AND INDUSTRIES**

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

**Effective: January 1, 2014**

[http://www.oregon.gov/boli/WHD/PWR/Pages/January\\_2014\\_Index.aspx](http://www.oregon.gov/boli/WHD/PWR/Pages/January_2014_Index.aspx)

**As Amended: April 1, 2014**

[http://www.oregon.gov/boli/WHD/PWR/docs/April\\_1\\_2014\\_Amendment.pdf](http://www.oregon.gov/boli/WHD/PWR/docs/April_1_2014_Amendment.pdf)

Created: September 15, 2011/Updated 4/3/12

Purpose of File:

Each Fiscal year, the OUS campuses are required to report data to the State Legislature on Minority, Women and Emerging Small Business Contractors and Sub-Contractors who provide goods and services. Various statistics are calculated, based on the data input being provided by the contractors. This file is for the collection of the data for each project by contract. Each University will compile statistics associated with all of their contracts during each fiscal year. Once consolidated at the University level, the information is sent to OUS who in turn consolidates all of the information from the seven institutions and reports it to the Legislature.

General Information on how to use the file:

You will fill this form out at least twice for your project. Small projects that do NOT span over the end of a fiscal year (June 30 – July 1) will require two submittals (An Initial and a Final). Any project spanning over the end of a fiscal year will require three submittals (Initial, Year-End and Final). For larger projects that span over multiple fiscal years, the Year-End report will need to be submitted multiple times.

The first Submittal will always be the “Initial” report which is due within 10 days of the execution of the contract or in the case of a CM/GC contract, the establishment of an Early Work Amendment or Guaranteed Maximum Price Amendment.

At the end of every fiscal year, you are required to submit a “Year-End” report.

At the completion of the project you are required to submit a “Final” report.

- 2) The areas shaded in gray in the OVERALL PROJECT DATA section are for input by the Contractor. The gray portion of the “Individual Contractor/Sub-Contractor Data Entry Matrix” is also an area intended for Contractor input.
- 3) For some items, a drop-down box is provided. This is to maintain the consistency of data used to sort information.
- 4) For other items, simply type in the information. If the type of information typed in is incorrect, you will get an error message or your results may look incorrect. For example, when you enter a date, simply type it: 8/17/11. You do not need to spell out the month.

Saving your file:

- 1) FILE NAMING CONVENTION – All files submitted to the campus shall be named as defined by the following naming convention: (filename = FYXX\_ContractNumber\_SubmissionStatus)

FYXX = XX refers to the two digit extension of the year. Example “FY12” for Fiscal Year 2012.

Include an underscore between the FYXX and the Contract Number. There should be no blanks in the filename.

ContractNumber = Insert the number that is established on the front of your contract with the campus.

Include an underscore between the Contract Number and the Submission Status. There should be no blanks in the filename.2)

SubmissionStatus = ”I” for Initial; “Y” for Year end; “F” for Final. This should correspond with what you select at the top of the report as explained in item 1 of “Filling Out the Form” below.

Filling Out the Form:

- 1) Use the drop-down box adjacent to the REPORT BEING SUBMITTED heading to pick the corresponding report you are submitting for your project. This will establish highlighted headings (in light green) in the “Individual C/S-C Data Entry Matrix” & OPERALL PROJECT DATA sections that define for you which columns or rows should be completely filled out prior to submission.

- 2) Next, fill in the information in the OVERALL PROJECT DATA section. Again, rows highlighted in green will tell you which cells to fill in based upon the type of report being submitted. Only fill in the cells that are highlighted. The top 5 cells should remain the same for the duration of the reporting on the project. Cell B-11 should also remain unchanged after the initial submittal. Cells B-14 thru B-16 may change over the life of the project if you add additional sub-contractors as the project progresses.
- 3) Once you have completed the OVERALL PROJECT DATA section, begin entering each sub-contractor in the "Individual C/S-C Data Entry Matrix table. Columns F, J, K & L are drop-down selections in the table area. Just pick the appropriate response for these columns. There are "notes" that pop up as you select cells in the columns that help explain what information is needed for each column.
- 4) **IMPORTANT:** Use the tab key to move across the columns. This is necessary in order to avoid generating false information in the cells so that calculations occur appropriately.
- 5) The first two rows of the Matrix are formatted to receive information. They will be identified in bright red when you make the selection of the type of form you are submitting (Cell B-1). To add another row that is properly formatted (like the rows above it), simply press the tab key when you get to the last column in the row you just filled in.
- 6) To change information in a cell, simply type over it or press the Delete key on your keyboard. Using other methods to change data can cause unwanted results. For example, copy and paste can add unwanted data. Using the spacebar to delete information actually leaves behind a space—which is a character—which will cause math errors.
- 7) You must have a State of Oregon Certification Number OR indicate that a contractor is self-identifying as a MWESB. If you have not filled in one of these, then the Name of the Contractor will remain bright red (which is an error symbol).
- 8) All cells in the CALCULATED REPORTING DATA section are automatically generated formulas and cannot be changed.
- 9) Columns to be completed are as follows:
  - Name of MWESB General/ Subcontractor:** List each MWESB used on the project (all tiers). If you as the General, are an MWESB contractor, submit your information in the first row.
  - State of Oregon MWESB Certification Number:** This is the number provided when a contractor or subcontractor applies for and receives this certification. Enter this number.
  - Self-Identified or Other Certified:** If a sub-contractor indicates that they are a women, minority or emerging small business, but doesn't have certification, indicate here by identifying with a "Yes" by picking it from the drop-down box.
  - Initial Sub-Contract Value:** This is the value of the subcontract-with the specific contractor listed, not to be confused with the value of the overall construction contract between the Contractor and the Owner. Once this number is entered, it should not change on subsequent submittals of the form.
  - Sub-Contract value billed within the fiscal year (July 1-June 30):** This is the value for work performed during the year being reported. If your reporting requirements span multiple years due to the size of your project, this information may be replaced by new information for subsequent years.
  - Final Sub-Contract Value:** This is the final value of the sub-contract, including any additions or deductions that occur over the course of the project.

**MORE THAN ONE OF THE FOLLOWING CATEGORIES CAN BE SELECTED:**

  - Minority-Owned:** Certified by the State of Oregon or self-identifying; select Yes from the drop-down if it applies or leave blank if it does not.
  - Women-Owned:** Certified by the State of Oregon or self-identifying; select Yes from the drop-down if it applies or leave blank if it does not.
  - Emerging Small Business:** Certified by the State of Oregon or self-identifying; select Yes from the drop-down if it applies or leave blank if it does not apply.
- 10) Check your work prior to submitting the document to make sure that all cells in (light green) highlighted rows or columns are completed. If you do not have light green highlights showing up on your document, please return to #1 in this section and follow the directions given. REMEMBER TO SAVE YOUR FILE AGAIN NOW.

**Submitting your Form:**

Follow the directions as provided by the campus you are contracted with to submit this document. Typically you should be given an E-mail address within your contract transmittal or cover letter for which to submit the file.





## CapCon MWESB Subcontractor Report

<b>REPORT BEING SUBMITTED</b>	
-------------------------------	--

### OVERALL PROJECT DATA

Reporting Period	2011
Campus	
General Contractor's Name	
Contract Number	
Project Name	
Contract Execution Date (Date Contract was Signed by the Owner)	
Date of Final Payment Application	
Initial Total Contract Value	
Total Contract Value billed within the fiscal year (July 1 - June 30)	
Final Total Contract Value	
Total Number of Subcontractors Used on Project	
Total Number of First-Tier Subcontractors Used on Project	
Number of First-Tier MWESB Subcontractors	

### CALCULATED REPORTING DATA (Self Calculating - No Data Entry)

Number of MWESB Subcontractors	0
% MWESB Subcontractors	
% First-Tier MWESB Subcontractors	

#### CERTIFIED MWESB TOTALS

Value Awarded to MWESB Contractors	\$0.00
% Value Awarded to MWESB Contractors	
Value - <b>minority-owned</b> MWESB subcontractors	\$0.00
% - <b>minority-owned</b> MWESB subcontractors	
Value - <b>women-owned</b> MWESB subcontractors	\$0.00
% - <b>women-owned</b> MWESB subcontractors	
Value - <b>emerging small business</b> MWESB subcontractors	\$0.00
% - <b>emerging small business</b> MWESB subcontractors	

#### SELF-IDENTIFIED or OTHER CERTIFIED MWESB TOTALS

Value - <b>self-identified or other certified</b> subcontractors	\$0.00
% - <b>self-identified or other certified</b> subcontractors	

#### OVERALL PROJECT CONTRACT HISTORY

% Value Awarded to MWESB Contractors at Initial Contract	#DIV/0!
% Value Awarded to MWESB Contractors at Final Contract	#DIV/0!

#### FOR OFFICIAL USE ONLY:

Date Received by the Campus	
Initials of Campus staff who checked the document	



## SUMMARY

### PART 1 GENERAL

#### 1.01 PROJECT

- A. Project Name: Architecture & Allied Arts Remodel
- B. Owner's Name: University of Oregon.
- C. Architect: Nir Pearlson, Architect
- D. The Project consists of a renovation in the existing Architecture & Allied Arts Lawrence Hall, University of Oregon, 1190 Franklin Blvd., Eugene, Oregon.

#### 1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Public Improvement Agreement Form.

#### 1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is shown on drawings and specified in Section 02 41 00.
- B. Scope of Alternation work is shown on drawings.
- C. Renovate the following areas, complete including operational electrical work and finishes:
  - a. Lawrence Hall 2<sup>nd</sup> Floor
    - i. West Wing: Rooms
    - ii. North Wing: Rooms
- D. Plumbing: Alter existing system and add new construction, keeping existing in operation. Refer to Drawings.
- E. HVAC: Refer to Drawings and Specifications.
  - 1. Abandon existing systems.
  - 2. Remove sections of existing systems.
  - 3. Install new systems.
- F. Electrical Power and Lighting: Alter existing systems, keeping existing in operation; add new construction. Refer to Drawings and Specifications
- G. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.
- H. Data: Alter existing systems, keeping existing in operation. Add new pathways. Refer to Drawings and Specifications.

#### 1.04 CONTRACT TIME

- A. Do not commence Work until after execution of the Agreement, receipt of Notice to Proceed from Owner, and Owner's approval of Contractor's certificates of insurance.
- B. Perform Work to accommodate Owner's occupancy requirements:
  - 1. Estimated Date of Notice to Proceed: July 7, 2014.
  - 2. Estimated Contractor Access to Site: July 7, 2014.
  - 3. Achieve Substantial Completion by September 5, 2014.
- C. Perform Work to achieve Final Completion of entire project by September 19, 2014.

#### 1.05 PERMITS AND INSPECTIONS

- A. Architect will prepare City building permit applications.
- B. Owner will pay all systems development, plan check, and permit fees directly to the City of Eugene.
- C. Contractor is responsible to pick up approved permits from authorities having jurisdiction.
- D. Contractor is responsible to arrange for and attend required permit inspections and provide evidence that all permit inspections have been made and approved in accordance with Section 01 70 00.

**1.06 WORK UNDER SEPARATE CONTRACT/ BY OWNER**

- A. Owner will award separate contracts or will provide for the following:
  1. Asbestos abatement.
  2. Specification and providing of door hardware.
  3. Voice and data cabling, termination, and activation. UO Network Services will provide wiring jacks and faceplates. The electrical contractor will provide all pathways and boxes for the voice/data.
  4. Fire sprinkler system modifications.
  5. Commissioning of HVAC System and Building Automation System.
  6. Window treatments.
  7. Equipment and Furniture.

**1.07 OWNER FURNISHED CONTRACTOR INSTALLED ITEMS**

- A. Owner will furnish the following for installation by Contractor:
  1. Door hardware.

**1.08 OWNER OCCUPANCY**

- A. Owner intends to occupy adjacent portions of the existing building during the entire construction period.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Coordinate Work activities with Owner's scheduled activities, quiet periods and building shut down. E. Schedule the Work to accommodate Owner occupancy.

**1.09 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Consult with U of O PM for security and access strategies to be implemented.
- C. Arrange use of site and premises to allow:
  1. Owner occupancy.
  2. Work by Owner.
  3. Use of site and premises by the public.
- D. Provide access to and from site as required by law and by Owner:
  1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Parking: Owner will provide two (2) University of Oregon parking hang tags for use in parking lots only (not at parking meters on street) for duration of the project. Additional permits may be obtained at Contractor's expense by contacting Office of Public Safety at (541) 346-5444, if available.
- E. Contractor Staging Areas: As indicated on Drawings. Contractor to limit staging to areas within project area.
- F. NO disposal or recycling on University property outside of construction area(s) unless approved by PM.
- G. NO stockpiling on waste on-site beyond the period necessary for sorting and accumulation of practical quantities for transport off-site.
- H. Utility Outages and Shutdown:
  1. Limit disruption of utility services to hours the building is unoccupied.
  2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days' notice to Owner and authorities having jurisdiction.
  3. Prevent accidental disruption of utility services to other facilities.

- I. Noise Control:
  - 1. Contractor is prohibited from making excessive noise such as that created by jack hammers, compressors, generators, drilling rigs, internal combustion engines, and other similar devices prior to 7:00 AM or after 8:00 PM unless notice is given to Owner at least 72 hours before operation and approval is received from Owner.
- J. Description of work times may be limited beyond requirements set by city codes.

**1.10 MATERIAL SAFETY DATA**

- A. Submit copies of Material Safety Data Sheets (MSDS) for materials and products used on site to Owner's Project Manager. Maintain separate copies of MSDS records at site.

**1.11 ASBESTOS CONTAINING MATERIALS WARNING**

- A. Asbestos containing materials are known to existing in areas of the Work. Contractor shall not, in any way, disturb materials which are known to contain asbestos, assumed to contain asbestos, or otherwise have not been tested and confirmed to be asbestos free. Where access to concealed spaces is required, or it is necessary to disturb building materials such as for drilling of holes, cutting, etc., notify Owner so that proper investigation and/or material procedures are followed.
- B. The Owner will investigate and test for asbestos containing materials and, if required, remove such materials as required for the Work.
- C. Contractor shall schedule five (5) days of slack or "down" time to allow for removal of asbestos discovered during demolition work without penalty to Owner for delay of the Contract.

**PART 2 PRODUCTS- NOT USED**

**PART 3 EXECUTION -NOT USED**

**END OF SECTION**



## PRICE AND PAYMENT PROCEDURES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.

#### 1.02 RELATED REQUIREMENTS

- A. Document B-7- Agreement Form: Contract Sum, retainages, payment period.
- B. Document B-8 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

#### 1.03 SCHEDULE OF VALUES

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- B. Forms filled out by hand will not be accepted.
- C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- D. Submit Schedule of Values in duplicate within 10 days after date of Owner-Contractor Agreement. E.

Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.

- F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- G. Revise schedule to list approved Change Orders, with each Application For Payment.

#### 1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Each calendar month ending on the last day of the month or date approved by Owner.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Present required information on electronic media printout.
- E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
- F. For each item, provide a column for listing each of the following:
  1. Item Number.
  2. Description of work.
  3. Scheduled Values.
  4. Previous Applications.
  5. Work in Place and Stored Materials under this Application.
  6. Authorized Change Orders.
  7. Total Completed and Stored to Date of Application.
  8. Percentage of Completion.
  9. Balance to Finish.
  10. Retainage.
- G. Execute certification by signature of authorized officer.

- H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
- I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- J. Submit four copies of each Application for Payment.
- K. Include the following with the application:
  - 1. Transmittal letter as specified for Submittals in Section 01 30 00.
  - 2. Construction progress schedule, revised and current as specified in Section 01 30 00.
  - 3. Wage Certification: Submit Payroll and Certified Statement Form complying with ORS 279.354 covering Contractor and sub-contractors.
  - 4. Daily Reports: Submit copies of daily reports for the pay period. Reports to include date, number of employees, subcontractors and number of employees, and brief description of work performed.
- L. Owner will not process incomplete payment applications or applications without attachments.
- M. Record Document Monitoring: Architect and Owner's Project Manager will review status of record document preparation under provisions of Section 01 70 00.
- N. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

**1.05 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 01 70 00.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



## **ADMINISTRATIVE REQUIREMENTS**

### **PART1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Preconstruction meeting.
- B. Progress meetings.
- C. Submittals for review, information, and project closeout.
- D. Number of copies of submittals.
- E. Submittal procedures.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements. B. Section 01 78 00 - Closeout Submittals: Project record documents.

#### **1.03 PROJECT COORDINATION**

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate completion and clean up work of separate sections in preparation for Substantial Completion.
- C. During construction, coordinate use of site and facilities through the Owner's Project Manager.
- D. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owners' activities.

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

### **PART 3 EXECUTION**

#### **3.01 PRECONSTRUCTION MEETING**

- A. Owner's Project Manager will schedule a meeting after Notice of Award. B. Attendance Required:
  - 1. Owner's Project Manager.
  - 2. Architect.
  - 3. Contractor's Project Manager and Superintendent.
- C. Agenda:
  - 1. Distribution of Contract Documents.
  - 2. Submission of list of Subcontractors, schedule of values, and progress schedule.
  - 3. Designation of personnel representing the parties to Contract, Owner and Architect.
  - 4. Designation of personnel representing the parties to Contract, and Architect.
  - 5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 6. Review use of site and access issues.
  - 7. Scheduling.
  - 8. Owner's environmental health and safety procedures and documentation.
  - 9. Identification of long lead time items of Work.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

**3.02 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the Work at maximum weekly intervals. B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner's Project Manager, Architect, as appropriate to agenda topics for each meeting.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review status of outstanding items from previous meetings
  - 3. Review of Work progress.
  - 4. Report.
  - 5. Review Schedule including work to be performed in next two week period.
  - 6. Identification of problems that impede, or will impede, planned progress.
  - 7. Review of submittals schedule and status of submittals.
  - 8. Architect's Report.
  - 9. Sub-Contractor Reports.
  - 10. Owner's Report.
  - 11. Change Items.
  - 12. Requests for Information.
  - 13. New Items.
  - 14. Other business relating to Work.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

**3.03 SUBMITTAL SCHEDULE**

- A. Architect will furnish Contractor a list of submittals required by individual specification sections. B. Coordinate schedule with Progress Schedule.
- C. Maintain Submittal Log to track progress of each submittal.
  - 1. Update log daily.
  - 2. Provide copies to Architect and Owner's Project Manager at each Progress Meeting.

**3.04 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product Data: Identify applicable products, models, options and other data.
  - 2. Shop Drawings: Prepare by competent drafters.
  - 3. Samples for Selection: Provide manufacturer's complete color and finish line for selection.
  - 4. Samples for Verification: Provide specified color / finish samples.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - CLOSEOUT SUBMITTALS.

**3.05 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  - 1. Certificates: Certify product conforms to or exceeds specified requirements.
  - 2. Test Reports: Record of test certifying conformance with specified requirements.
  - 3. Inspection Reports.
  - 4. Manufacturer's Installation Instructions: Complete installation instructions.

5. Manufacturer's Field Reports: Reports verifying conformance with specified requirements.
6. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

### **3.06 SUBMITTALS FOR PROJECT CLOSEOUT**

A. When the following are specified in individual sections, submit them at project closeout:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

### **3.07 NUMBER OF COPIES OF SUBMITTALS**

A. Documents for Review:

1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies which the Contractor requires, plus four which will be retained by the Architect, Owner and Consultants.
2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions which Contractor requires, plus four which will be retained by Architect, Owner, and Consultants.

B. Documents for Information: Submit three copies.

C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.

1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.08 SUBMITTAL PROCEDURES**

A. Transmit each submittal with approved form.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Deliver submittals to Architect at business address.

F. Schedule submittals to expedite the Project, and coordinate submission of related items.

G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor. H.

Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work. I.

Provide space for Contractor and Architect review stamps.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

- L. Submittals not requested will not be recognized or processed.

**END OF SECTION**

## CONSTRUCTION PROGRESS SCHEDULE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

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

#### 1.02 RELATED SECTIONS

- A. Section 01 10 00 -Summary: Work sequence.

#### 1.03 REFERENCES

#### 1.04 SUBMITTALS

- A. Within 7 days after date of Agreement, submit preliminary schedule . B.  
Submit updated schedule with each Application for Payment.
- C. Submit the number of opaque reproductions that Contractor requires, plus three copies which will be retained by Architect and Owner.
- D. Submit under transmittal letter form.

#### 1.05 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Diagram Sheet Size: Maximum 11 x 17 inches or width required. C.  
Scale and Spacing: To allow for notations and revisions.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 PRELIMINARY SCHEDULE

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

#### 3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- D. Indicate delivery dates for owner-furnished products.
- E. Provide legend for symbols and abbreviations used.

#### 3.03 BAR CHARTS

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

#### 3.04 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.

- B. Evaluate project status to determine work behind schedule and work ahead of schedule. C.  
After review, revise as necessary as result of review, and resubmit within 7 days.

**3.05 UPDATING SCHEDULE**

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

**3.06 DISTRIBUTION OF SCHEDULE**

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

**END OF SECTION**

## QUALITY REQUIREMENTS

### PART1 GENERAL

#### 1.01 SECTION INCLUDES

- A. References and standards.
- B. Mock-ups.
- C. Control of installation.
- D. Tolerances.
- E. Testing and inspection services.
- F. Manufacturers' field services.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

#### 1.03 REFERENCE STANDARDS

- A. ASTM C1021 -Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008.
- B. ASTM C1077- Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2011c.
- C. ASTM D3740- Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- D. ASTM E329- Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2011.
- E. ASTM E543- Standard Specification for Agencies Performing Nondestructive Testing; 2009.

#### 1.04 SUBMITTALS

- A. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section. f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Conformance with Contract Documents.
    - k. When requested by Architect, provide interpretation of results.
  - 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
- B. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

- C. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
  - 1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

### **1.05 REFERENCES AND STANDARDS**

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

### **1.06 TESTING AND INSPECTION AGENCIES**

- A. Owner will employ and pay for services of an independent testing agency to perform specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

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

## **PART 3 EXECUTION**

### **3.01 CONTROL OF INSTALLATION**

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

### **3.02 MOCK-UPS**

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.



- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

### **3.03 TOLERANCES**

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

### **3.04 TESTING AND INSPECTION**

- A. See individual specification sections for testing required.
- B. Testing Agency Duties:
  1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  2. Perform specified sampling and testing of products in accordance with specified standards.
  3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
  5. Perform additional tests and inspections required by Architect.
  6. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
  1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.
  3. Agency may not assume any duties of Contractor.
  4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
  1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

**3.05 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

**3.06 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

**END OF SECTION**

**TEMPORARY FACILITIES AND CONTROLS****PART 1 GENERAL****1.01 SECTION INCLUDES**

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

**1.02 TEMPORARY UTILITIES**

- A. Provide and pay for all temporary lighting and ventilation required for construction purposes.
- B. Existing electrical, water, and heating facilities may be used. Do not waste electricity, heat, and water.

**1.03 TELECOMMUNICATIONS SERVICES**

- A. Provide, maintain, and pay for cellular telephone service to site. Provide at time of project mobilization.
- B. Telecommunications services shall include:

**1.04 TEMPORARY SANITARY FACILITIES**

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

**1.05 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition. Location indicated on Drawings.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.06 INTERIOR ENCLOSURES**

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

**1.07 PROTECTIONS OF EXISTING SURFACES AND FURNISHINGS**

- A. Provide protective coverings at walls, floors, and other existing construction.

**1.08 PROTECTIONS OF THE WORK**

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings for walls, projections, jambs, and sills of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic from landscape areas.

**1.09 DUST CONTROL**

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

**1.10 SECURITY**

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

**1.11 VEHICULAR ACCESS AND PARKING - See Section 01 10 00.**

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets. D.  
Designated existing on-site roads may be used for construction traffic.

**1.12 PROGRESS CLEANING AND WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site at least weekly.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
- E. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- F. Remove debris and rubbish from pipe chases, plenums, stud cavities and other closed or remote spaces, prior to enclosing the space.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

## PRODUCT REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Re-use of existing products.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations and procedures.
- E. Procedures for Owner-furnished products.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: List of products to be furnished by Owner. B. Document 01 60 01 -Substitution Request Form.
- C. Section 02 41 00- Demolition: Removal of existing items to be re-installed.

#### 1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

### PART 2 PRODUCTS

#### 2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

#### 2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents. B. Do not use products having any of the following characteristics:
  - 1. Made using or containing CFC's or HCFC's.

#### 2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

**2.04 MAINTENANCE MATERIALS**

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

**PART 3 EXECUTION**

**3.01 SUBSTITUTION PROCEDURES**

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. After date of contract, the Owner may, at its option, consider formal requests from Contractor for substitution of products for those specified. One or more of the following conditions must be documented:
  - 1. Compliance with final interpretation of code requirements or insurance regulations.
  - 2. Unavailability of a specified Product through no fault of the Contractor.
  - 3. Inability of specified Product to perform or fit in designated place.
  - 4. Manufacturer's or fabricator's refusal to certify or guarantee performance of a specified product.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1. Requests for substitution must be submitted on approved Substitution Request Form - Section 01 60 01.
  - 2. Submit four copies of request for substitution for consideration. Limit each request to one proposed substitution.
  - 3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 4. The Architect will notify Contractor in writing of decision to accept or reject request.
  - 5. Architect will document approved substitutions during bidding period by addenda.

**3.02 OWNER-SUPPLIED PRODUCTS**

- A. See Section 01 10 00- Summary for identification of Owner-furnished products.
- B. Owner's Responsibilities:
  - 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
  - 2. Arrange and pay for product delivery to site.

3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:

1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

**3.03 TRANSPORTATION AND HANDLING**

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

**3.04 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- H. Prevent contact with material that may cause corrosion, discoloration, or staining.
- I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**









## **EXECUTION AND CLOSEOUT REQUIREMENTS**

### **PART1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, except payment procedures.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 30 00 -Administrative Requirements: Submittals procedures.
- C. Section 01 50 00- Temporary Facilities and Controls: Temporary interior partitions.
- D. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.
- E. Section 02 41 00 - Demolition: Demolition of portions of existing structures; site utility demolition.

#### **1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.

#### **1.04 PROJECT CONDITIONS**

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
  - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
  2. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.
- D. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

## **PART 2 PRODUCTS**

### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

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

### **3.03 PREINSTALLATION MEETINGS**

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

- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### **3.04 LAYING OUT THE WORK**

- A. Verify layout prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- D. Periodically verify layouts.

### **3.05 GENERAL INSTALLATION REQUIREMENTS**

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

### **3.06 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  1. Verify that construction and utility arrangements are as shown.
  2. Report discrepancies to Architect before disturbing existing installation.
  3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
  1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on Drawings.
- C. Remove existing work as indicated and as required to accomplish new work.
  1. Remove items indicated on Drawings.
  2. Relocate items indicated on Drawings.
  3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
  1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

- a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
- b. See Section 01 10 00 for other limitations on outages and required notifications.
- c. Provide temporary connections as required to maintain existing systems in service.
- 4. Verify that abandoned services serve only abandoned facilities.
- 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch as specified for patching new work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- H. Refinish existing surfaces as indicated:
  - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
  - 3. Patch as specified for patching new work.
- I. Clean existing systems and equipment.
- J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- K. Do not begin new construction in alterations areas before demolition is complete.
- L. Comply with all other applicable requirements of this section.

### **3.07 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-conforming work.
- D. Execute cutting and patching to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

- F. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- H. Restore work with new products in accordance with requirements of Contract Documents.
- I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
- K. Patching:
  1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  2. Match color, texture, and appearance.
  3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
- L. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- M. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

### **3.08 PROGRESS CLEANING**

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

### **3.09 PROTECTION OF INSTALLED WORK**

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

### **3.10 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and owner seven days prior to start-up of each item.

- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.11 DEMONSTRATION AND INSTRUCTION**

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

### **3.12 ADJUSTING**

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

### **3.13 FINAL CLEANING**

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.14 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  1. Provide copies to Architect and Owner.



- B. Notify Architect when work is considered ready for Substantial Completion.
- C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
- D. Owner will occupy all of the building as specified in Section 01 10 00.
- E. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.
- F. Notify Architect when work is considered finally complete.
- G. Complete items of work determined by Architect's final inspection.

**END OF SECTION**



## CLOSEOUT SUBMITTALS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Operation and Maintenance Data.
- B. Warranties and bonds.
- C. Spare parts and maintenance materials.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01 30 00- Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures. C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

#### 1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
  2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  3. Submit 1 copy of completed documents at 75 percent completion. This copy will be reviewed and returned, with Architect comments. Revise content of all document sets as required prior to final submission.
  4. Submit three sets of revised final documents in final form within 10 days prior to submission of final application for payment.
  5. Note: Per General Conditions, Form B-8, Owner will not make payments beyond 75 percent of the contract amount until Operation and Maintenance Manual have been submitted.
- C. Warranties and Bonds:
  1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### **3.02 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  1. Product data, with catalog number, size, composition, and color and texture designations.
  2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.
- D. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

### **3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. For Each Item of Equipment and Each System:
  1. Description of unit or system, and component parts.
  2. Identify function, normal operating characteristics, and limiting conditions.
  3. Include performance curves, with engineering data and tests.
  4. Complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required. F.  
Include manufacturer's printed operation and maintenance instructions. G.

Include sequence of operation by controls manufacturer.

- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Include test and balancing reports.
- J. Additional Requirements: As specified in individual product specification sections.

### **3.04 OPERATION AND MAINTENANCE MANUALS**

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Air and water balance reports.
    - c. Certificates.
- J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

### **3.05 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized. C.  
Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

### **3.06 SPARE PARTS AND MAINTENANCE MATERIALS**

- A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.

- B. Deliver to Project site and place in location directed by Owner's Project Manager; obtain receipt and submit to Architect prior to application for final payment.

**END OF SECTION**

## **DEMOLITION**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Selective demolition of building elements for alteration purposes.
- B. Removal and replacement of miscellaneous items and devices to facilitate Work.
- C. Other demolition as required to complete the Work.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- E. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

#### **1.03 PROJECT CONDITIONS**

- A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- B. Comply with other requirements specified in Section 01 70 00.

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

### **PART 3 EXECUTION**

#### **3.01 SCOPE**

- A. Remove items indicated, for salvage, relocation, and reuse.

#### **3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
- B. Provide, erect, and maintain temporary barriers and security devices.
- C. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
- D. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
- E. Do not close or obstruct roadways or sidewalks without permit.
- F. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- G. Do not begin removal until receipt of notification to proceed from Owner.
- H. Do not begin removal until built elements to be salvaged or relocated have been removed.
- I. Protect existing structures and other elements that are not to be removed.
- J. Provide bracing and shoring.

- K. Prevent movement or settlement of adjacent structures.
- L. Stop work immediately if adjacent structures appear to be in danger.
- M. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- N. Perform demolition in a manner that maximizes salvage and recycling of materials.
- O. Dismantle existing construction and separate materials.
- P. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

### **3.03 SELECTIVE DEMOLITION FOR ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as shown.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
- C. Remove existing work as indicated and as required to accomplish new work. 1. Remove items indicated on drawings.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
  - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  - 3. See Section 01 10 00 for other limitations on outages and required notifications.
  - 4. Verify that abandoned services serve only abandoned facilities before removal.
  - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch as specified for patching new work.

### **3.04 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**



## CONCRETE REINFORCEMENT

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete and masonry structures.
- B. Supports and accessories for steel reinforcement.

#### 1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Drawing sheets S100 and S200, General Structural Notes.

#### 1.03 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- B. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International; 2004.
- C. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2014.
- D. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute; 1998.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

#### 1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301.
- B. Perform Testing and Inspections according to Section 01 40 00 and requirements of Structural Drawing Sheets S100 and S200 – General Structural Notes.
- C. Conform to Testing, Inspections, and Special inspections requirements of OSSC.

### PART 2 PRODUCTS

#### 2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Supplement S-1, Grade 60 (420), ASTM A 706 For all welded deformed bars, use E70 low hydrogen electrodes.
  - 1. Plain billet-steel bars.
  - 2. Unfinished.
- B. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gage.
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

#### 2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is not permitted, unless shown on drawings.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required. Set wire ties so that ends are directed into concrete, not toward exposed concrete surfaces. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Allow observation by Architect at completion of placement.
- C. Comply with Special Inspection requirements for reinforcing and concrete work.
- D. Maintain concrete cover around reinforcing per Structural Drawings.
- E. Conform to applicable code for concrete cover over reinforcement.
- F. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.

**END OF SECTION**

**CAST-IN-PLACE CONCRETE****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Floors and slabs on grade.
- B. Concrete foundations.
- C. Concrete curing.

**1.02 RELATED SECTIONS**

- A. Section 03 20 00 - Concrete Reinforcement.
- B. Structural Drawing Sheets S100 and S200 – General Structural Notes.

**1.03 REFERENCES**

- A. ACI 301 - Specifications for Structural Concrete for Buildings; 2010.
- B. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- D. ACI 308 - Standard Practice for Curing Concrete; American Concrete Institute International; 2001.
- E. ASTM C 33 - Standard Specification for Concrete Aggregates; 2012.
- F. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2014.
- G. ASTM C 150 - Standard Specification for Portland Cement; 2012.
- H. ASTM C 171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.
- I. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2010.
- J. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- K. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2013.
- L. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2013.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Concrete Mix Design:
  1. See Structural Calculations for designed minimum 28-day compressive strengths for all concrete site and structural.
  2. Proportioning Normal Weight Concrete: Comply with ACI 211.1.
  3. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301
  4. Provide concrete mix design along with recent test results indicating mix design exceeding specified performance strengths
  5. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 at rates recommended by manufacturer.
  6. Supplier is responsible for achieving or exceeding concrete design strengths.
  7. Adjust cement ratio when mix calls for air entrainment.
  8. Limit the content of chlorides, sulphates, and salts to ACI guidelines for applicable uses.

**1.06 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301.
- B. Perform Testing and Inspections according to Section 01 40 00 and requirements of Structural Drawing Sheets S100 and S200 – General Structural Notes.
- C. Conform to Testing, Inspections, and Special inspections requirements of OSSC.

**PART 2 PRODUCTS****2.01 CONCRETE MATERIALS**

- A. Cement: ASTM C 150, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Water: Clean, potable and not detrimental to concrete.
- D. Use the same manufacturer and brand for all exposed concrete.

**2.02 ADMIXTURES**

- A. Air Entrainment Admixture: ASTM C 260, add 4% plus or minus 1 1/2% of concrete volume entrainment for concrete exposed to freeze/thaw cycles.
- B. Optional "Water-Reducing Admixtures: ASTM C 494, Type A - Water Reducing.
- C. Fly Ash: ASTM C 618, Type C or F.

**2.05 MIXING**

- A. Transit Mixers: Comply with ASTM C 94/C 94M.

**PART 3 EXECUTION****3.01 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Ensure reinforcement will not be disturbed during concrete placement.
- D. Do not wet set anchor bolts or other embedded items.
- E. Do not interrupt successive placement; do not permit cold joints to occur.
- F. Accurately position, support, and secure reinforcement against displacement.

**3.03 CURING AND PROTECTION**

- A. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  - 1. Normal concrete: Not less than 7 days.

**3.04 FIELD QUALITY CONTROL**

- A. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- B. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements. Conform to Section 01400.

**3.05 DEFECTIVE CONCRETE**

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

**END OF SECTION**



**STRUCTURAL STEEL FRAMING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural steel framing members.
- B. Base plates.
- C. Anchor bolts for structural steel and setting templates

**1.02 RELATED SECTIONS**

- A. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel Work.

**1.02 REFERENCE STANDARDS**

- A. AISC 360-05 Manual of Steel Construction; American Institute of Steel Construction, Inc.; 2005, 13<sup>TH</sup> Edition.
- B. Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2005 (Excluding Sections 3.1, 3.4, 3.5 and 4.2).
- C. Specification for Structural Joints Using ASTM A325 or A490 Bolts; American Institute of Steel Construction, Inc.; 2004.
- D. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2012.
- E. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- F. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2012.
- G. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- H. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- I. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2014.
- J. ASTM E 94 - Standard Guide for Radiographic Testing; 2010.
- K. ASTM E 142 - Standard Method for Controlling Quality of Radiographic Testing; 1992.
- L. ASTM A 992 Standard Specification for Steel for Structural Shapes for use in Building Framing; 2011.
- M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- N. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2010.
- O. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2000).

**1.04 SUBMITTALS**

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

- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

### **1.05 QUALITY ASSURANCE**

- A. Fabricate structural steel members in accordance with AISC " Manual of Steel Construction".
- B. Perform Testing and Inspections according to Section 01 40 00 and requirements of Structural Drawing Sheets S100 and S200 – General Structural Notes.
- C. Conform to Testing, Inspections, and Special inspections requirements of OSSC.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Channels, Plates, and Angles: ASTM A36 (Fy=36 ksi).
- B. Structural Tubing: ASTM A 500, Grade B (Fy=46 ksi).
- C. Tube Steel and Pipe: ASTM A 53, (Fy=35 ksi), Type S where exposed to view, Type E where concealed from view, Grade B with sulfur not exceeding 0.05%.
- D. Carbon Steel Bolts and Nuts: ASTM A 307, Grade A Bolts. ASTM A563 Grade A Hex Nuts.
- E. Structural Steel High-Strength Bolts, Nuts, and Washers: ASTM A 325; ASTM A563 Grade C Heavy Hex Nuts.
- F. Anchor Bolts: F1554, Grade 36.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Epoxy Adhesive for anchoring system to concrete or concrete masonry. Epoxy Resin conforming to ASTM C 881, Type IV, Grade 3, Class B or C.

### **2.02 FABRICATION**

- A. Shop fabricate to greatest extent possible.

### **2.03 FINISH**

- A. Shop prime structural steel members. Do not pre-prime surfaces that will be field welded, or in contact with concrete.

### **2.04 SOURCE QUALITY CONTROL AND TESTS**

- A. Welded Connections: Visually inspect all shop-welded connections except full penetration welds.
  1. Full Penetration Welds: Ultrasonic testing performed in accordance with ASTM E 164.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 ERECTION**

- A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with AISC " Specification for Structural Joints Using ASTM A325 or A490 Bolts".



- D. Do not field cut or alter structural members without approval of Architect.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

**3.03 ERECTION TOLERANCES**

- A. Per Code of Standard Practice Section 7.13.

**3.04 FIELD QUALITY CONTROL**

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

**END OF SECTION**



## METAL FABRICATIONS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood framing.
- B. Section 09 90 00 - Painting and Coating: Paint finish.

#### 1.03 REFERENCE STANDARDS

- A. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2012.
- B. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- C. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

#### 1.04 SUBMITTALS

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

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Steel Pipe: ASTM A283
- B. Steel Plate: ASTM A283.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- D. Epoxy: Two part, epoxy based adhesive, non-shrink anchor grouting material.
  - 1. SET22 by Simpson Strong Tie: [www.strongtie.com](http://www.strongtie.com).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

#### 2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

#### 2.03 FABRICATED ITEMS

- A. Ramp Handrail: Steel pipe; 1-1/2 inch diameter; welded connections; provide holes for screws.

#### 2.04 FINISHES - STEEL

- A. Prime paint all steel items.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.

- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.

**2.05 FABRICATION TOLERANCES**

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

**PART 3 EXECUTION**

**3.01 EXAMINATION**

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

**3.02 INSTALLATION**

- A. Coordinate installation with wall framing specified in Section 06 10 00 - Rough Carpentry.
- B. Install items plumb and level, accurately fitted, free from distortion or defects.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.
- D. Set base plate in recess in concrete and secure with epoxy.

**3.03 TOLERANCES**

- A. Maximum Variation From Plumb: 1/8 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/8 inch.
- C. Maximum Out-of-Position: 1/8 inch.

**END OF SECTION**

## ROUGH CARPENTRY

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Non-structural dimension lumber framing.
- C. Sheathing.
- D. Concealed wood blocking, nailers, and supports.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 18 10 - Glue-Laminated Structural Units
- B. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard.

#### 1.03 REFERENCE STANDARDS

- A. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association; 2012.
- B. PS 1 - Structural Plywood; 2009.
- C. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.
- D. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; West Coast Lumber Inspection Bureau; 2004, and supplements.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

### PART 2 PRODUCTS

#### 2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
  - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
  - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://www.alsc.org)) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

#### 2.02 DIMENSION LUMBER

- A. Grading Agency: West Coast Lumber Inspection Bureau (WCLIB).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6 ):
  - 1. Grade: No. 1.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2.

- 2. Boards: No. 2.

### **2.03 CONSTRUCTION PANELS**

- A. Wall Sheathing and Floor Underlayment: Plywood, PS 1, Grade C-D, Exposure I.

### **2.04 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

### **3.02 FRAMING INSTALLATION**

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

### **3.03 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

### **3.04 INSTALLATION OF CONSTRUCTION PANELS**

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails or screws.

### **3.05 TOLERANCES**

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

**END OF SECTION**

## GLUED-LAMINATED BEAMS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Glue laminated wood beams.

#### 1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing
- B. Section 06 10 00 - Rough Carpentry

#### 1.03 REFERENCE STANDARDS

- A. AITC A190.1 - American National Standard for Wood Products - Structural Glued Laminated Timber; American Institute of Timber Construction; 2007.
- B. ASTM A 36/A 36m - Standard Specification for Carbon Structural Steel; 2012.
- C. ASTM D 2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior (Wet Use) Exposure Conditions; 2012.
- D. WWPA G-5 - Western Lumber Grading Rules; Western Wood Products Association; 2011.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Size of members, loads, and cambers.
  - 1. Submit design calculations

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer/Fabricator: Company specializing in manufacture of glue laminated structural units with three years of documented experience, and certified by AITC in accordance with AITC 190.1.
  - 1. Factory mark each piece of structural glu-lam timber with AITC Quality Mark. Place mark on surfaces that will not be exposed in the completed work.
- B. Design structural members under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Oregon.

#### 1.07 REGULATOR REQUIREMENTS

- A. Conform to applicable code for loads, seismic zoning, and other load criteria.

#### 1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Comply with provisions in AITC 111 "Recommended Practice for Protection of Structural Glued Laminated Timber during Transit, Storage, and Erection."
- B. Individually wrap members with plastic-coated paper covering with water resistant seams.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Manufacturers:
  - 1. Western Structures, LLC: [www.westernstructures.com](http://www.westernstructures.com)
  - 2. Rosboro: [www.rosboro.com](http://www.rosboro.com)
  - 3. Weyerhaeuser: [www.woodbywy.com](http://www.woodbywy.com)
  - 4. Or approved equal.
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Glued-Laminated Grades: AITC 110
  - 1. Premium Grade at Exposed Conditions.

- C. Lumber: Softwood lumber conforming to WWPA grading rules with 12 percent maximum moisture content before fabrication.
- D. Laminating Adhesive: Tested for wet/exterior service in accordance with ASTM D 2559.
- E. End Sealer: Manufacturer's standard transparent, colorless wood sealer that is effective in retarding transmission of moisture of cross-grain cuts and is compatible with indicated finish.

## **2.02 FABRICATION**

- A. Fabricate glue laminated structural members in accordance with AITC 117.
- B. Cut and fit members accurately to length to achieve tight joint fit.
- C. Fabricate member with camber built in.
- D. Do not splice or join members in locations other than those indicated.
- E. After end trimming, seal with penetrating sealer in accordance with AITC requirements

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify adequacy of supports.
- B. Verify sufficient end bearing area.

### **3.02 PREPARATION**

- A. Coordinate placement of bearing items.

### **3.03 ERECTION**

- A. Lift members using protective straps to prevent visible damage.
- B. Set structural members level and plumb, in correct positions or sloped where indicated.
- C. Fit members together accurately without trimming, cutting, or other unauthorized modification.

### **3.04 TOLERANCES**

- A. Framing Members: 3/8 inch maximum from true position.

**END OF SECTION**



**FINISH CARPENTRY****PART 1 GENERAL****1.01 SECTION INCLUDES**

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

**1.02 RELATED REQUIREMENTS**

- A. Section 06 41 00 - Architectural Wood Casework
- B. Section 08 14 16 - Flush Wood Doors.
- C. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.

**1.03 REFERENCE STANDARDS****1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.

**1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom grade.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect work from moisture damage.

**1.07 PROJECT CONDITIONS**

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

**PART 2 PRODUCTS****2.01 LUMBER MATERIALS**

- A. Interior Trim: Douglas fir species, smooth sawn, maximum moisture content of 6 percent; with vertical grain, 1 and 2 Clear grade.

**2.02 FASTENINGS**

- A. Fasteners: Of size and type to suit application; galvanized finish in concealed locations and galvanized finish in exposed locations.
- B. Concealed Joint Fasteners: Threaded steel.

**2.03 FABRICATION**

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

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.

**3.02 INSTALLATION**

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

**3.03 PREPARATION FOR SITE FINISHING**

- A. Set exposed fasteners. Sand work smooth.
- B. Site Finishing: See Section 09 90 00.

**3.04 TOLERANCES**

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

**END OF SECTION**

## ARCHITECTURAL WOOD CASEWORK

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Specially fabricated office mail box units.
- B. Specially fabricated cabinet units.
- C. Countertops.
- D. Cabinet hardware.
- E. Factory finishing.
- F. Preparation for installing utilities.

#### 1.02 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
- B. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- C. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

#### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- E. Samples: Submit actual sample of proposed countertop material, minimum 6 inches square.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in fabricating the products specified, with minimum five years documented experience.

### PART 2 PRODUCTS

#### 2.01 CABINETS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI Architectural Woodwork Standards for Grades as indicated.
- B. Wood Veneer Faced Cabinets: Custom grade.
  - 1. Exposed Surfaces: Grade AA, Birch, random-matched.
  - 2. Semi-Exposed Surfaces: Grade A, Birch, random-matched.
  - 3. Concealed Surfaces: Grade B, Birch, random-matched.
- C. Veneer Plywood - see under counter tops
- D. Plastic Laminate Faced Cabinets: Custom Grade.
  - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
  - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
  - 3. Finish - Concealed Surfaces: Manufacturer's option.
  - 4. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
  - 5. Door and Drawer Front Retention Profiles: Fixed panel.

6. Casework Construction Type: Type A - Frameless.
7. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
8. Adjustable Shelf Loading: 50 lbs. per sq. ft.
9. Cabinet Style: Flush overlay.
10. Cabinet Doors and Drawer Fronts: Flush style.

## 2.02 WOOD-BASED COMPONENTS

- A. Softwood Lumber NIST PS20; Graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom; average moisture content of 6 percent.
- B. Formaldehyde: Not Permitted.
- C. Wood fabricated from old growth timber is not permitted.

## 2.03 LAMINATE MATERIALS

- A. Manufacturers:
  1. Formica Corporation: [www.formica.com](http://www.formica.com).
  2. Panolam Industries International, Inc\Nevamar: [www.nevamar.com](http://www.nevamar.com).
  3. Wilsonart International, Inc: [www.wilsonart.com](http://www.wilsonart.com).
  4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as scheduled.
  1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
  2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
  3. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.

## 2.04 COUNTERTOPS

- A. Quartz Stone Countertops: Custom Grade
  1. Basis of Design: Dal Tile, Micro-Flecks Collection "One Quartz"; Finish: Polished; Thickness: 1-1/4"; Edge: Square with 1/8" radiused corners.
  2. Manufacturers:
    - a) Dal Tile: [www.daltile.com](http://www.daltile.com)
    - b) Silestone: [www.silestoneusa.com](http://www.silestoneusa.com)
    - c) Caesarstone: [www.caesarstoneus.com](http://www.caesarstoneus.com)
  3. Backsplash: Of same material as countertop; Layout per drawings; 3/4" thick; square profile.
  4. Color: per schedule.
  5. Schedule: Conference Room.
- B. Hardwood Veneer Plywood: NIST PS1; Premium graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Veneer sheets as needed for curved surfaces. Veneer core, 3/4 inch thick or as shown in drawings, Birch species, veneer face both sides.
  1. Manufacturers and Product Names:
    - a) Europly, by Columbia forest Products
    - b) Substitutions: See Section 01 60 00 - Product Requirements.
  2. Schedule: Administrative Service Counter

## 2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
  1. Color: As selected by Architect from manufacturer's standard range.
  2. Use at all exposed plywood edges.
  3. Use at all exposed shelf edges.
- C. Fasteners: Size and type to suit application.

- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- E. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

## 2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Pins:
  - 1. Diameter: .5mm
  - 2. Color: Nickel
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
  - 1. Product: 117.50.610 manufactured by Hafele.
- D. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
- E. Catches: Magnetic.
- F. Drawer Slides:
  - 1. Type: Full extension with overtravel.
  - 2. Static Load Capacity: Heavy Duty grade.
  - 3. Mounting: Side mounted.
  - 4. Stops: Integral type.
  - 5. Features: Provide self closing/stay closed type.
  - 6. Products:
    - a) Accuride International, Inc: [www accuride.com](http://www accuride.com).
    - b) Grass America Inc: [www.grassusa.com](http://www.grassusa.com).
    - c) Hettich America, LP: [www.hettichamerica.com](http://www.hettichamerica.com).
    - d) Knappe & Vogt Manufacturing Company: [www.knappeandvogt.com](http://www.knappeandvogt.com).
    - e) Substitutions: See Section 01 60 00 - Product Requirements.
- G. Hinges: European style concealed self-closing type, steel with polished finish.
  - 1. Products:
    - a) Grass America Inc: [www.grassusa.com](http://www.grassusa.com).
    - b) Hardware Resources: [www.hardwareresources.com](http://www.hardwareresources.com).
    - c) Hettich America, LP; Sensys: [www.hettichamerica.com](http://www.hettichamerica.com).
    - d) Julius Blum, Inc: [www.blum.com](http://www.blum.com).
    - e) Substitutions: See Section 01 6000 - Product Requirements.
- H. Grommets: Plastic ring type, 3 inch, black.

## 2.07 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
  - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
  - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Hardwood veneer plywood countertop: Laminate multiple layers to achieve an exposed edge thickness of 2". Laminate thin veneer sheets at curved surfaces.
- F. Use solid birch lumber at edge of bench per drawings.
- G. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

**2.08 SHOP FINISHING**

- A. Sand work smooth and set exposed nails and screws.
- B. For opaque finishes, apply wood filler in exposed nail and screw indentations & sand smooth.
- C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- D. Finish work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:
  - 1. Transparent:
    - a) System - 9, UV Curable, Acrylated Epoxy, Polyester or Urethane.
    - b) Sheen: Satin.
  - 2. Administrative Service Counter transparent coating:
    - a) Epoxy Kleer Coat #30 by U.S. Composites. Apply per manufacturer instructions.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

**3.02 INSTALLATION**

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

**3.03 ADJUSTING**

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

**3.04 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

**3.05 SCHEDULE**

- A. Conference Room:
  - 1. Base and Upper cabinets: (PLAM-1) Wilsonart. Color: Slate Gray, D91K-18.
  - 2. Countertop: (QTZ-1) Dal Tile Geo-Flecks Collection "One Quartz." Color: Stormy sky, NQ24.
- B. Bench: Wood Veneer.
- C. Administrative Service Counter:
  - 1. Base Cabinets: Wood Veneer.
  - 2. Countertop: Veneer Plywood.

**END OF SECTION**

## BOARD AND BATT INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Board insulation in roof curbs construction.
- B. Thermal batt insulation in roof construction.
- C. Batt insulation used for sound isolation.

#### 1.02 REFERENCE STANDARDS

- A. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2014.
- B. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

#### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation, and installation techniques.

#### 1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

### PART 2 PRODUCTS

#### 2.01 BOARD INSULATION MATERIALS

- A. Approved Manufacturers:
  - 1. Atlas Roofing Corp. [www.atlasroofing.com](http://www.atlasroofing.com)
  - 2. Apache Products Company: [www.apacheproducts.com](http://www.apacheproducts.com).
  - 3. Celotex Corporation: [www.celotex.com](http://www.celotex.com).
  - 4. GAF Materials Corporation: [www.gaf.com](http://www.gaf.com).
  - 5. Or approved equal.
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Products:
  - 1. Roof Insulation: AC Foam-III, by Atlas Roofing corp. approved.
- C. General Board Insulation Characteristics:
  - 1. Rigid cellular foam made of closed-cell polyisocyanurate, complying with ASTM C 1289-95, type II.
  - 2. Board Size: 48 inch x 96 inch.
  - 3. Board edges: square.
- D. Board Roof Insulation Additional Characteristics:
  - 1. Facing: fiber-reinforced felt on both sides.
  - 2. Board thickness: as shown on drawings.
  - 3. Thermal Resistance: as shown on drawings.
  - 4. Compressive strength: as recommended by insulation board manufacturer for standing seam metal roof construction.

**2.02 BATT INSULATION MATERIALS**

- A. Batt Insulation: ASTM C 665; preformed glass fiber batt; conforming to the following:
  - 1. Thickness as indicated on drawings to cover full depth of wall cavity.
  - 2. Facing: Faced on one side with kraft paper, Perm rating 1.0 or less.
  - 3. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, when tested in accordance with ASTM E 84.
  - 4. Thermal Resistance:
    - a) At roof: R-38.
  - 5. Manufacturers:
    - a) CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
    - b) Johns Manville International, Inc: [www.johnsmanville.com](http://www.johnsmanville.com).
    - c) Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
    - d) Or approved equal.
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Batt Insulation used for sound isolation in interior walls and ceilings.
  - 1. Thickness: 3.5" and 5.5".
  - 2. Facing: Faced on one side as needed. Attachment with paper.
  - 3. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, when tested in accordance with ASTM E 84.
  - 4. Manufacturers:
    - a) CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
    - b) Johns Manville International, Inc: [www.johnsmanville.com](http://www.johnsmanville.com).
    - c) Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
    - d) Or approved equal.
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

**2.03 ACCESSORIES**

- A. Vapor Tape: Self-adhering type, mesh reinforced, 2 inch wide, compatible with insulation facing. Perm rating to meet or exceed that of insulation facing.
- B. Adhesive: Type recommended by insulation manufacturer for application.

**PART 3 EXECUTION****3.01 EXAMINATION**

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

**3.02 BATT INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in roof cavity spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory applied vapor retarder membrane facing warm side (in Winter) of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane

**3.03 RIGID BOARD INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install with joints butted tight, and required cuts made clean to abut new thermal barrier materials tight to building surfaces.



- C. Apply sufficient pressure to each insulation unit to securely position and adhere each unit to the substrate. Do not allow units to disbond from substrate.

**END OF SECTION**



## ELASTOMERIC MEMBRANE ROOFING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Single-Ply Roofing and Accessories.
- B. Repairs at Roof Penetrations.

#### 1.02 REFERENCE STANDARDS

- A. Not Used.

#### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Samples: Actual pieces of materials specified, not less than 3 by 5 inches (75 by 125 mm).

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, sealed packaging.
- B. Stack materials under cover, avoid twisting and deformation, and store products in manufacturer's unopened packaging until ready for installation.
- C. Store adhesives and caulking at temperatures between 60 F – 80 F.

#### 1.05 PROJECT CONDITIONS

- A. All substrates shall be clean, dry, and free of contaminants such as petroleum, solvents, acids, etc.

#### 1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Provide manufacturer 15-year standard system warranty for commercial buildings.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Mule-Hide Products Co., Inc.: [www.mulehide.com](http://www.mulehide.com).
- B. GenFlex Roofing Systems.: [www.genflex.com](http://www.genflex.com).
- C. Substitutions: See Section 01 60 00 - Product Requirements.

#### 2.02 MATERIALS

- A. The same Single-Ply Roofing material as present at project site.
  - 1. Heat-welded.
  - 2. Reinforced with integral scrim.
  - 3. Color: Grey
  - 4. Thickness: 60 mil.

#### 2.03 ACCESSORIES

- A. Mechanical fasteners and discs - per manufacturer.
- B. Slip Sheet - per manufacturer.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared and sloped so that water will drain to building exterior.
- B. Verify that surfaces to receive roofing are thoroughly dry, free from loose materials, and reasonably smooth, with no projections or sharp edges that could puncture flashing.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
  - 1. Install slip sheets as recommended by mfr.
  - 2. Lap roofing edges 5 inches min.
  - 3. Attach fasteners using In-Lap Fastening Method.
  - 4. Provide continuous 1 ½" min. wide weld using hot-air method.
  - 5. Install cant strips and nailers per mfr.
  - 6. Membrane overlaps shall be shingled with or parallel with the direction of flow of water.
  - 7. All existing roofing repairs shall be done per manufacturer's recommendations.

**END OF SECTION**

## SHEET METAL FLASHING AND TRIM

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Flashings, Counter flashings.

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 53 00 - Elastomeric Membrane Roofing.
- B. Section 09 90 00 - Painting and Coating.

#### 1.03 REFERENCE STANDARDS

- A. ASTM D 226 - Standard specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 7<sup>th</sup> Edition.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

#### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and Stainless Steel. "Suggested Practices for Roofing, Flashing, Copings, Fascias, Gravel Stops, and Drainage" distributed by the Nickel Development Institute and the National Roofing Contractors Association "NRCA Construction Details., except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented Coastal experience.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

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

### PART 2 PRODUCTS

#### 2.01 SHEET MATERIALS

- A. Stainless Steel: ASTM A167, Type 302B, dead soft temper: 20 gage. Finish:4.
  - 1. Stainless Steel Fasteners: #6 x 1" Security Screw - Self Tapping Button Head, Hex Socket, and Pin Drive. Grade 304.
- B. Galvanized Steel: ASTM A446, Grade A, G90 zinc coating; 24 gage core steel; 22 gage at cleats. Factory finished with Kynar paint system at window sill flashing - PT-2.B - see drawings. Match existing adjacent windows.
- C. Fabricated Shapes:
  - 1. Miscellaneous flashings and counter-flashings at roof curbs as shown in drawings.

#### 2.02 ACCESSORIES

- A. Fasteners: Concealed Stainless Steel whenever possible, galvanized elsewhere. With soft neoprene washers as appropriate, or other appropriate means of fastening.
- B. Protective Backing Paint: Zinc chromate alkyd.
- C. Sealant: Polyurethane Type specified in Section 07 92 00.

- D. Plastic Cement: ASTM D 4586, Type I.
- E. Downspout Anchorage Devices: SMACNA requirements.
- F. Downspout Supports: Pre-finished sheet metal straps.

### **2.03 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward ½ inch and hemmed to form drip.
- G. Dimensions as shown in drawings and as measured in field.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify roof curbs are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

#### **3.02 PREPARATION**

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

#### **3.03 INSTALLATION**

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

#### **3.04 SEALANT INSTALLATION**

- A. Sealant Installation: Apply 1/4-inch diameter bead, centered in full length of joint.
- B. Asphalt Plastic Cement Installation: Trowel apply 1/8 inch thick.

#### **3.05 CLEANING AND REPAIRING**

- A. Clean, repair, or replace work of this and other sections by performing work described in this section.

**END OF SECTION**

## JOINT SEALANTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Sealants (and joint backing) between different assemblies.

#### 1.02 REFERENCE STANDARDS

- A. ASTM C 834 - Standard Specification for Latex Sealants; 2010.
- B. ASTM C 920 - Standard Specification for Elastomeric Joint sealants; 2014.
- C. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2013.
- D. ASTM D 1667 - Standard Specification for Flexible Cellular Materials Poly (Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

#### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. Samples: Submit two samples, 6 inches in length, illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years documented experience.

#### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Polyurethane Sealants:
  1. Bostik: [www.bostik.com](http://www.bostik.com).
  2. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  3. Sonneborn Building Products, ChemRex, Inc.: [www.chemrex.com](http://www.chemrex.com).
  4. Tremco, Inc.: [www.tremcosealants.com](http://www.tremcosealants.com).
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Acrylic Emulsion Latex Sealants:
  1. Bostik: [www.bostik.com](http://www.bostik.com).
  2. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  3. Sonneborn Building Products, ChemRex, Inc.: [www.chemrex.com](http://www.chemrex.com).
  4. Tremco, Inc.: [www.tremcosealants.com](http://www.tremcosealants.com).
  5. Substitutions: See Section 01 60 00 - Product Requirements.

#### 2.02 SEALANTS

- A. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
  1. Color: Standard colors as selected by Architect.
  2. Applications: Use for:

- a) Joints between concrete and other materials.
  - b) Joints between metal frames and other materials.
  - c) Other exterior joints for which no other sealant is indicated.
- B. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, single component, paintable.
- 1. Color: Colors as selected by Architect..
  - 2. Applications: Use for:
    - a) Interior wall and ceiling control joints.
    - b) Joints between door and window frames and wall surfaces.
    - c) Other interior joints for which no other type of sealant is indicated.

### **2.03 ACCESSORIES**

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C 1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.
- H. Remove and replace joints improperly tooled.

### **3.04 CLEANING**

- A. Clean adjacent soiled surfaces.

### **3.05 PROTECTION OF FINISHED WORK**

- A. Protect sealants until cured.

**END OF SECTION**



## **WOOD DOORS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Reuse of flush swing wood doors; non-rated.
- B. New custom paneled barn doors.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 08 71 00 - Door Hardware.
- B. Section 09 90 00 - Painting and Coating: Site finishing of doors.

#### **1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Specimen warranty.
- D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Warranty, executed in Owner's name.

#### **1.05 QUALITY ASSURANCE**

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

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

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

#### **1.07 PROJECT CONDITIONS**

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Provide warranty for the following term:
  - 1. Interior Doors: Life of installation.
- D. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

**PART 2 PRODUCTS****2.01 DOORS**

- A. All Doors: See drawings for locations and additional requirements.
  - 1. Quality Level: Premium Grade, in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1300.
  - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
  - 1. Provide solid core doors.
  - 2. Wood veneer facing for clear finish.

**2.02 DOOR CONSTRUCTION - BARN DOORS**

- A. 3-ply construction per drawings.
- B. 3/4" MDF core.
- C. Plywood outer layers w/ finish veneer facing.
  - 1. Veneer Facing: White oak.
  - 2. Nosing/Edge framing: Solid white oak.
- D. Stainless Steel Kick Plate.

**2.03 RE-USE PROCEDURES - EXISTING DOORS**

- A. Protect glazing
- B. Remove hardware.
- C. Sand wood surfaces.
- D. Repair with matching wood filler.
- E. Apply Clear finish - per Section 09 90 00.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

**3.02 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Use machine tools to cut or drill for hardware.
- C. Coordinate installation of doors with installation of frames and hardware.

**3.03 COATING/FINISHING**

- A. Pre-finish in shop or in field.
- B. See Section 09 90 00 - Painting and Coating.

**3.04 TOLERANCES**

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.
- C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 by 84 inches surface area.
- D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 by 84 inches surface area.

**3.05 ADJUSTING**

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

**END OF SECTION**



## ACCESS DOORS AND FRAMES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Non-Rated Architectural wall and ceiling access door. (BNTC Series)
- B. Related hardware and attachments.

#### 1.02 RELATED SECTIONS:

- A. Section 09 26 00 - Gypsum Board Assemblies.
- B. Section 09 51 00 - Acoustical Panel Ceilings.
- C. Section 09 90 00 - Paints and Coatings.
- D. Division 15 - Mechanical.
- E. Division 16 - Electrical.

#### 1.03 SYSTEM DESCRIPTION

- A. Obtain specific locations and sizes for required access doors and frames from trades, including mechanical and electrical, requiring access to concealed equipment and indicate on submittal schedule.

#### 1.04 SUBMITTALS

- A. Product Data: Manufacturer's technical data for each type of access door and panel assembly, including setting drawings, templates, fire-resistive characteristics, finish requirements, and details of anchorage devices.
  - 1. Include complete schedule, types, locations, construction details, finishes, latching or locking provisions, and other pertinent data.
- B. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Package and ship per manufacturer's recommendations.
- B. Store per manufacturer's instructions.
  - 1. Store in dry area out of direct sunlight.

#### 1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Warrant materials and workmanship against defects after completion and final acceptance of Work.
  - 1. Repair defects, or replace with new materials, faulty materials or workmanship developed during the guarantee period at no expense to Owner.
  - 2. Access Panel Warranty: 1 year from date of shipment.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from the following manufacturer:
  - 1. Babcock Davis
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

#### 2.02 MATERIALS

- A. Commercial quality, cold steel sheet with gray baked on powder coat finish.
- B. Galvanized, bonderized steel with gray baked on powder coat finish.

**2.03 ACCESS PANELS**

- A. Non rated flush access doors
  - 1. Door: Fabricate from 14-gauge cold rolled sheet steel, with multiple mounting configurations.
  - 2. Frame: Fabricate from 16-gauge cold rolled sheet steel. Provide 1/4 inch mounting holes and easy install tabs.
    - a) BNT - All surfaces - 1 inch flange at perimeter.
    - b) BNW - Wallboard surfaces – drywall bead at perimeter.
    - c) BNP - Plaster surfaces – 22-gauge galvanized plaster bead at perimeter.
  - 3. Hinge:
    - a) BNT – Concealed pin type, spring loaded to allow for door removal.
    - b) BNW and BNP – pin type, spring loaded to allow for door removal.
  - 4. Latching/Locking Devices: Screwdriver cam latch - standard.
  - 5. Finish:
    - a) Gray baked on powder coat finish.
    - b) Galvanized, bonderized steel, with gray baked on powder coat finish.

**2.04 FABRICATION**

- A. Manufacture each access panel assembly as an integral unit ready for installation.
- B. Framing to include integral anti-flexing technology, with ¼ inch mounting holes, to reduce the twist of frame during installation.
- C. Easy Install Tabs integral to framing for multiple installation methods.
- D. Furnish number of latches required to hold door in flush, smooth plane when closed.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that rough openings for door and frame are correctly sized and located.
- B. Verify mechanical and electrical requirements for ceiling or wall access panels.

**3.02 PREPARATION**

- A. Advise installers of work relating to access panel installation including rough opening dimensions, locations of supports, and anchoring methods. Coordinate delivery with other work to avoid delay.

**3.03 INSTALLATION**

- A. Install access door and frame units per manufacturer's written instructions.
- B. Install frames plumb and level in opening. Secure rigidly in place.
- C. Position units to provide convenient access to concealed Work requiring access.

**3.04 ADJUST AND CLEAN**

- A. Adjust panel after installation for proper operation.
- B. Remove and replace panels or frames that are warped, bowed, or damaged.

**END OF SECTION**

## **WOOD WINDOWS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Casement window sashes and accessories.

#### **1.02 RELATED SECTIONS**

- A. Section 06 20 00 - Finish Carpentry.
- B. Section 08 80 00 - Glazing.
- C. Section 09 90 00 - Painting and Coating.

#### **1.03 REFERENCE STANDARDS**

- A. ASTM C1036 - Flat Glass
- B. ASTM E283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
- C. ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Performance.
- D. ASTM E547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- E. ASTM E2190-08 - Specification for Sealed Insulated Glass Units.
- F. Federal Specifications- FL L-S-125B - Screening, Insect Non-Metallic.- FS DD-G-451D - Glass, Float or Plate, Sheet.
- G. AAMA/WDMA/CSA 101/I.S.2/A440-05 Standard and Specification for Windows, Doors and Unit Skylights.
- H. WDMA I.S.4 - 2000. - Industry Standard for WaterRepellent Preservative Treatment for Millwork.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: show rough openings, unit dimensions, and fenestration of specialty units as required.
- C. Insulated Glass Warranty.

#### **1.05 QUALITY ASSURANCE**

- A. Sealed Durability of Insulating Glass Test – ASTM E2190-08.
- B. Argon Gas Concentration of Insulating Glass Units Test – ASTM E2649-09.
- C. Harmonized Insulating Glass Testing Standards as designated by IGCC and IGMA.
- D. NFRC Certification Program for Energy Ratings of Fenestration Products.
- E. AAMA Certification Program. AAMA Gold Label.

#### **1.06 DELIVERY AND STORAGE**

- A. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.
- B. Store and protect products from job site damage. Uninstalled products must be protected from exposure to the weather.

#### **1.07 INSULATED GLASS WARRANTY**

- A. Provide manufacturer's insulated glass lifetime limited warranty for failure of the seal resulting in impaired vision due to moisture, film, or dust between glass.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Northwest Door and Sash, approved equal.
  - 1. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 MATERIALS**

- A. Wood: Kiln-dried selected softwoods or engineered wood products.
- B. Sash material to be Solid Vertical Grain Douglas Fir.
- C. Provide alternate for Sash material to be Sapele Mahogany, paint grade.
- D. Dimensions of components will be based on existing historic windows, and designed for perfect fit into existing frames.

### **2.03 WINDOW SASHES**

- A. Refer to drawings for window schedule indicating sizes and configuration of units and type of components, colors, glazing, and additional data.
- B. Complete sash made to fit opening for accurate weather stripping contact and clearances.
- C. Sash bottoms factory cut to accommodate existing sill.
- D. Complete perimeter weather stripping installed in sash edges, near exterior face of sash.
- E. Machining of sash tops and bottoms to accommodate the re-use of existing Friction Hinges.

### **2.04 GLAZING**

- A. All glazing to be  $\frac{3}{4}$  inch insulated glass, annealed (not tempered),  $\frac{1}{2}$  inch airspace, PPG Solarban 60 low-e, with light bronze spacers.
- B. Provide alternate for PPG Solarban 70.

### **2.04 LITES**

- A. All sashes are to be True Divided Lite.

### **2.05 WEATHERSTRIPPING**

- A. Silicone Bulb weather-stripping is to be provide for site application by other to the stops on the jambs at all four sides.

### **2.06 SILL CLADDING**

- A. Sheet metal cladding over existing sill - see drawings.

### **2.07 HARDWARE**

- B. Concealed Casement Hinges: reuse existing; remove, clean, and re-install on new sashes.
- C. Latches: Solid Bronze Sash Latches and Strikes to be provided two per operable sash, US10B finish.

### **2.08 FINISH**

- A. One coat of oil based Primer to be factory applied on all surfaces.
- B. Finish painting per Section 09 90 00.



**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Verify rough openings are correctly sized and located.
- B. Beginning of installation means acceptance of existing conditions.

**3.02 PREPARATION**

- A. Prepare opening to permit correct installation of window sash unit.

**3.03 INSTALLATION**

- A. Install sill cladding and sealant per drawings.
- B. Install windows in accordance with manufacturer's instructions.
- C. Align windows plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work. Secure assembly to frame openings without distortion or stress.
- D. Ensure sash is sealed to window frame.

**3.04 CLEANING**

- A. Clean exterior and interior surfaces of window frames and glass after installation. Do not damage interior or exterior finishes.
- B. Remove labels and visible markings. Comply with manufacturer's recommendations for cleaning glass.
- C. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged at no expense to owner.

**END OF SECTION**



## UNIT SKYLIGHTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Unit skylight mounted on site-built curbs..

#### 1.02 RELATED REQUIREMENTS

- A. Section 08 80 00 - Glazing.

#### 1.03 REFERENCE STANDARDS

- A. ASTM E 283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specific Pressure Differences Across the Specimen.
- B. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- C. ASTM E 331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- D. ASTM E 1886 – Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- E. ASTM E 1996 – Standard Specifications for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
- F. National Fenestration Rating Council, NFRC 100, Procedure for Determining Fenestration Product U-factors.
- G. National Fenestration Rating Council, NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
- H. National Fenestration Rating Council, NFRC 300, Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.
- I. Occupational Safety & Health Administration, OSHA Standards – 29 CFR 1910.23, Guarding Floor Openings and Holes.
- J. TAS 201-94, Standard Impact Test Procedures
- K. TAS 202-94, Standard Criteria for Testing Impact and Non Impact Resistant Building Envelope Components using Uniform Static Air Pressure Loading.
- L. TAS 203-94, Standard Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

#### 1.04 SYSTEM DESCRIPTION

- A. Skylight: Fixed curb mount skylight that consists of five integrated components - an interior condensation drainage gasket, an insulating glass unit, exterior structural sealant, roll-formed aluminum frame counter flashing with ASA corner keys.
- B. Configuration: Fixed unit, curb mounted.
- C. Size: Velux CMA4949 or equivalent 48 inch square skylight - field verify to fit existing conditions.
- D. Condensation Control: Integral internal condensation collection system and drainage slots.

#### 1.05 PERFORMANCE REQUIREMENTS

- A. The FCM curb mount skylight is independently tested in accordance with listed standards for compliance with the unit skylight provisions of the 2003, 2006 and 2009 IBC, IECC, and IRC as follows:

1. AAMA/WDMA/CSA 101/I.S.2/A440-05 (NAFS-05) and AAMA/WDMA/CSA 101/I.S.2/A440-08 (NAFS-08)
  2. Performance Grades must be greater than or equal to:
    - a) Downward design pressure = 170 psf
    - b) Uplift Design Pressure = 70 psf
  3. AAMA/WDMA/CSA 101/I.S.2 (NAFS-02)
  4. Rated pressures must be greater than or equal to:
    - a) Downward design pressure = 150 psf
    - b) Uplift Design Pressure = 85 psf
- B. Air leakage: Maximum of 0.2 l/s/m<sup>2</sup> (0.04 CFM/ft<sup>2</sup>) of total unit area, measured at a differential pressure of 75 Pa (1.57 psf) in accordance with ASTM E 283, per the NAFS standards in (A).
- C. Water infiltration: No water penetration noted as measured in accordance with ASTM E 331 with a test pressure differential of 720 Pa (15.0 psf). Exceeds requirements of NAFS standards in (A).
- D. Thermal Performance: U-factor = 0.51 Btu/hr\*ft<sup>2</sup>\*F° or less, SHGC = 0.26 or less and [Vt = 0.52 or greater (clear)] or [Vt = 0.39 (white)]. Tested and certified in accordance with NFRC 100 and 200 procedures. 2010 ENERGY STAR® qualified in all U.S. zones.
- E. FCM skylights with impact glazing (06): Tested and certified in accordance with ASTM E 1886 and ASTM E 1996, Cycle Pressure +50/-50, Missile Level D, Wind Zone 3.
- F. FCM skylights with impact glazing (07): Tested and certified in accordance with approved Miami-Dade County Test Proposal #09-1669, Design Pressure rating of +70/-70 psf.
- G. Limit member deflection to flexure limit of glass with full recovery of glazing materials.
- H. System accommodates, without damage to components or deterioration of seals, movement between and frame and curb.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's installation details and product data sheets.
- C. Shop Drawings: Indicate unit size, material types, gauge, finishes, and installation details.
- D. Warranty, executed in Owner's name.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience.
- B. Skylights shall be manufactured to the highest standards of quality and craftsmanship in ISO 9001 and ISO 14001-certified facilities.
- C. Flashings shall be engineered and manufactured to match up with the roofing material and skylight.

#### **1.06 COORDINATION**

- A. Coordinate unit skylight flashing requirements with roofing system.
- B. Coordinate size and locations of site built curbs with actual unit skylights provided.
- C. Pre-installation conference: conduct conference at (project site).

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

- A. Deliver products in manufacturer's original containers dry and undamaged, with seals and labels intact.
- B. Store and protect products in accordance with manufacturer's recommendations.

**1.08 WARRANTY**

- A. Standard product warranty.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Velux America Inc., or approved equal.
- B. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Maintenance-free Exterior Aluminum Frame and Covers: Roll-formed 15 gauge, 1.5-mm (0.06") thick, prefinished neutral gray, production engineered and fabricated to fit.
- B. Field Fasteners: (Skylight frame to curb) #8 x 1-3/4" Stainless steel self-drill screw (# per skylight as indicated in manufacturer's installation instructions).
- C. Dual sealed Glazing
  - 1. White-laminated (translucent), dual sealed thermal pane with warm edge technology, 95% argon gas fill, and with three layers of LoE<sup>3</sup> silver that increases visible light over standard low-e coatings while lowering the solar heat gain. The following glazing options are available:
    - a) 04 – Tempered LoE<sup>3</sup> pane over a laminated heat strengthened interior pane with 0.030" interlayer.
- D. Weather stripping: Factory applied neoprene and thermoplastic elastomeric weather stripping around entire frame, profiled to effect weather seal.

**2.03 FLASHING**

- A. Custom flashing provided by others

**2.04 FABRICATION**

- A. Fabricated one piece aluminum counter flashing system with corner keys.
- B. Provide internal drainage of glazing spaces with exterior through gasketing to remove condensation.
- C. All units are factory glazed with structural silicone-based primary seal.
- D. Site-built curb required.
- E. Site-built fabricated flashings to be installed.

**2.05 FINISHES**

- A. Exterior surfaces: Maintenance-free roll-formed aluminum frame with neutral gray Kynar® 500 polyvinylidene fluoride resin finish.
- B. Maintenance-free flashing: Roll-formed aluminum, neutral gray, baked on polyester polyamide primer and finish coats.
- C. Interior surface: Provided by others, other than glass.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify curb and rough opening dimensions, squareness, roof pitch, and proper orientation of skylight.

**3.02 INSTALLATION**

- A. Install skylight in accordance with manufacturer's installation instructions and local code requirements.
- B. Align skylight with curb, free of warp or twist, maintaining dimensional tolerances.
- C. Attach skylight to curb with screws furnished by manufacturer.
- D. Coordinate attachment and seal of perimeter air and vapor barrier material.
- E. Provide insulation of the curb for maximum energy efficiency.
- F. Install manufacturer's prefabricated engineered flashing in accordance with manufacturer's installation instructions to achieve weather tight installation.
- G. Install sunscreening products and electrical or manual controls.

**3.03 CLEANING**

- A. Clean exposed skylight according to manufacturer's written instructions. Touch up damage to metal coatings and finishes.
- B. Remove excess sealants, dirt, and other substances.
- C. During the construction process, protect skylight surfaces from contact with contaminants.

**3.04 FIELD QUALITY CONTROL**

- A. Install skylight, flashing, and accessories in accordance with manufacturer's installation instructions.

**END OF SECTION**

## DOOR HARDWARE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Installation of Owner furnished hardware for wood doors.
- B. Provision and installation of Barn door hardware

#### 1.02 RELATED SECTIONS

- A. Section 01 10 00 - Summary of Work: Work Under Separate Contract/By Owner.
- B. Section 08 14 16 - Flush Wood Doors.

#### 1.03 REFERENCE STANDARDS

- A. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; 2004.
- B. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; Door and Hardware Institute; 1993; also in WDHS-1/WDHS-5 Series, 1996.

#### 1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

#### 1.05 QUALITY ASSURANCE

- A. Installer: Company specializing in installation of commercial door hardware with five years of experience.

#### 1.06 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Coordinate Owner's keying requirements during the course of the Work.

### PART 2 PRODUCTS

#### 2.01 DOOR HARDWARE - GENERAL

- A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide all items of a single type of the same model by the same manufacturer.

#### 2.02 PRODUCTS

- A. Owner Furnished Contractor Installed Hardware.

#### 2.02 BARN DOOR PRODUCTS

- A. Track: Specifications are based on Coburn Classic Flat Track Barn Door Hardware; [www.coburn.co.uk](http://www.coburn.co.uk).
  1. Install a flat track, 2-inch wide; ¼-inch thick; total length: 27-foot, 2-inch.
  2. Provide a minimum number of continuous sections, spliced with a connector.
  3. Attach track to beam with lag-bolt and wall spacer, spaced at 18-inches or per mfr.
  4. Install 1 door stop near each end of the track.
  5. Finish: Brushed steel.
- B. Hangers: Specifications are based on Coburn Classic Flat Track Barn Door Hardware; [www.coburn.co.uk](http://www.coburn.co.uk).
  1. Install 2 "Classic Flat Track Hanger" 289mm long face mount hangers at each door.

2. Attach hangers to door with thru-bolts. Nuts may be recessed into back of door.
  3. Install 1 "Anti-Jump Block" Device near each hanger.
  4. Finish: Brushed steel.
- C. Floor guide:
1. Install 1 Floor mount U-Channel guide at each door.
- D. Door pull: Specifications are based on Rustica Hardware Modern Flush Barn Door Hardware; [www.rusticahardware.com](http://www.rusticahardware.com).
1. Install 1 "Modern Flush" 10-inch long door pull each door, recessed into door.
  2. Finish: Brushed steel.
- E. Cane bolt: Specifications are based on GateLatchUSA; [www.gatelatchusa.com](http://www.gatelatchusa.com).
1. Bolt and components material and finish: stainless steel, mill finish
  2. Bolt dimensions: 24-inch long, 5/8 inch diameter.
  3. Install 1 Drop Cane Bolt at each door.
  4. Components at each door bolt assembly:
    - a) 1 Bolt
    - b) 2 guides – attached to door with SS screws
    - c) 1 Top hanger bracket – attached to door with SS screws
    - d) 2 Strike plate at floor – attached to floor with SS screws - at open and locked positions
  5. Bolt shall be lockable in both the engaged and the disengaged positions, with a padlock, to be provided by Owner.

### **2.03 KEYING & PADLOCKS**

- A. By Owner.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to center line of hardware item:
1. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush Doors."

### **3.02 ADJUSTING**

- A. Adjust work under provisions of Section 01 70 00.
- B. Adjust hardware for smooth operation.

### **3.03 SCHEDULE**

- A. To be provided by owner.

**END OF SECTION**



## THRESHOLDS

### GENERAL

#### 1.01 SUMMARY

- A. Section Includes: Commercial Thresholds

#### 1.02 RELATED SECTIONS

- A. Section 08 14 00: Wood Doors.

#### 1.03 REFERENCE STANDARDS

- A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
  1. ANSI/BHMA A156.18: Materials and Finishes.
  2. ANSI/BHMA A156.21 Thresholds.
- B. Underwriters Laboratories, Inc. (UL):
  1. UL 10B Fire Tests of Door Assemblies.
  2. UL 10C Fire Tests of Door Assemblies.
  3. UL 410 Slip Resistance for Floor Surface Materials.

#### 1.04 SYSTEM DESCRIPTION

- A. Design Requirements: Provide threshold and seal products which have been manufactured, fabricated and installed to meet the following design criteria:
  1. Performance obtained from test procedures ICC/ANSI A117.1.
  2. Compliant with UL 410.
  3. Compliant with ADA standards.

#### 1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.
- B. Samples: Submit one each of manufacturer's standard selection samples.

#### 1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.

#### 1.07 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

#### 1.08 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

## **PART 2 PRODUCTS**

### **2.01 THRESHOLDS**

- A. Manufacturer: Pemko Manufacturing Company. Select one of the options below, to be installed at six doors:
  - 1. Half Saddles/Offset Saddles:
    - a) Material: Extruded tempered aluminum 6063-T6.
    - b) Finish: Dark bronze anodized aluminum.
    - c) Manufacturer Model Number: 158D
  - 2. Carpet/Special Purpose Thresholds:
    - a) Material: Extruded tempered aluminum 6063-T6.
    - b) Finish: Dark bronze anodized aluminum.
    - c) Width: 3".
    - d) Manufacturer Model Number: 230D.

## **PART 3 EXECUTION**

### **3.01 MANUFACTURER'S INSTRUCTIONS**

- A. Comply with the instructions and recommendations of the threshold manufacturer.

### **3.02 EXAMINATION**

- A. Site Verification of Conditions:
  - 1. Verify that site conditions are acceptable for installation of thresholds.
    - a) Examine doors and frames for compliance with requirements for door and frame manufacturer's installation tolerances, labeled fire door assembly construction, wall and floor construction and other conditions affecting performance.
  - 2. Do not proceed with installation of thresholds until unacceptable conditions are corrected.

### **3.03 INSTALLATION**

- A. Mounting Location: Comply with drawings and approved shop drawings.
- B. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
- C. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- D. Rubber Ramps: Install using "Liquid Nails" per manufacturer's installation instructions.

### **3.04 ADJUSTING**

- A. Perform adjustments required to ensure that thresholds function in compliance with manufacturer's performance criteria prior to acceptance by Owner.

### **3.05 CLEANING**

- A. Remove any protective films and clean components as necessary following manufacturer's recommended procedures.

### **3.05 PROTECTION**

- A. Protect installed work from damage due to subsequent construction activity on the site.

**END OF SECTION**

## GLAZING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Flat Glass.
- B. Insulating glass units.
- C. Glazing accessories.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 20 00 - Finish Carpentry
- B. Section 07 92 00 - Joint Sealants: Sealant and back-up material.
- C. Section 08 52 00 - Wood Windows
- D. Section 08 62 00 - Unit Skylights

#### 1.03 REFERENCE STANDARDS

- A. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2011.
- B. ASTM C 1036 - Standard Specification for Flat Glass; 2011.
- C. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; 2012.
- D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2011.
- E. ASTM E 1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012.
- F. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
- G. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; 2008.

#### 1.04 DEFINITIONS

- A. Sealed Insulating Glass Surfaces:
  1. Side 1 – Exterior surface of outer pane.
  2. Side 2 – Interior surface of outer pane.
  3. Side 3 – Interior surface of inner pane.
  4. Side 4 – Exterior surface of inner pane.

#### 1.05 PERFORMANCE REQUIREMENTS

- A. Wind Speed and Exposure: 90 MPH, Exposure C. Resist wind pressures at building elevations and discontinuities indicated.
- B. Select type and thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with Oregon Structural Specialty code.
  1. Use the procedure specified in ASTM E 1300 to determine glass type and thickness.
  2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
  3. Design to resist seismic forces in OSSC Zone 3.
  4. Thicknesses listed are minimums.
- C. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
  1. In conjunction with materials described in Section 07210, 07650, and 07900.

2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.
- D. Interior Door Glazing
1. Single pane, clear, thickness to meet OSSC.

### **1.06 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Samples: Submit two samples 12 x 12 inch in size of glass units, showing coloration and design.
- E. Manufacturer's Certificate: Certify that sealed insulated glass meets or exceeds specified requirements.

### **1.07 QUALITY ASSURANCE**

- A. Perform Work in accordance with GANA Glazing Manual, and FGMA Sealant Manual for glazing installation methods.
- B. Safety Glass Standard: Comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
- C. Insulating Glass Certification: Permanently mark units with Insulating Glass Certification Council, or Associated Laboratories, Inc. label.
- D. Comply with Requirements of UBC/OSSC Chapter 24
- E. Installer Qualifications: Company specializing in performing the work of this section with minimum ten years documented experience.

### **1.08 PROJECT/SITE CONDITIONS**

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.
- C. Field Measurements: Verify prior to fabrication.

### **1.09 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide a ten (10) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.
- C. Provide a ten (10) year warranty to include coverage for delamination of laminated glass and replacement of it.

## **PART 2 PRODUCTS**

### **2.01 FLAT GLASS MATERIALS**

- A. Manufacturers: PPG Solarban 60; or approved equal meeting the requirements of this section.
- B. Clear Uncoated Float Glass: Clear, annealed. All glass shall be clear and smooth unless otherwise noted on the drawings. Glass shall meet requirements of ASTM C 1036, Type 1, Class 1, Quality q3.
  1. Nominal Thickness: ¼" ; Provide thicker glass as necessary due to sizes, imposed loads, and conditions of service.
- C. Tempered Safety Glass: Clear; fully tempered in accordance with ASTM C 1048, Kind FT.

1. Scope: Where indicated on drawings or required by OSSC.
- D. Low E Glass: Float type, heat strengthened, clear.
  1. Coating on No. 3 surface.
  2. Minimum Thickness: 1/4 inch.

## 2.02 SEALED INSULATING GLASS UNITS

- A. Insulated Glass Units:
  1. Fabricate units in accordance with ASTM E 774, Class CBA.
  2. All glass clear unless otherwise specified.
  3. Place Low E coating on No. 2 surface within the unit.
  4. Durability: comply with ASTM E 774 and E 773.
  5. Purge interpane space with dry hermetic air.
  6. Total unit thickness: 3/4 inch.
- B. Performance Characteristics
  1. Visible light transmittance: 69%
  2. Winter U-Value: 0.29 or lower
  3. Summer U-Value: 0.29 or lower
  4. Shading Coefficient: 0.42-.45
- C. Edge Seal Construction: Provide unit edge seals meeting requirements of ASTM E 773, with aluminum spacers having mitered corners, and silicone sealant for glass-to-spacer seals.
- D. Edge Seal Material: dark color where exposed to view.
- E. Skylight Glazing: see Section 08 62 00: Materials

## 2.03 GLAZING COMPOUNDS

- A. As recommended by glazing manufacturer for particular application.

## 2.04 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self-adhesive on one face.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
- D. For aluminum faced infill panel, see section 08410 – Aluminum Storefront.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

### 3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels and recesses with primer and sealer compatible with substrate.
- C. Prime surfaces scheduled to receive sealant in accordance with sealant manufacturer's instructions.
- D. Install sealant in accordance with manufacturer's instructions.

**3.03 INSTALLATION**

- A. Install with proper orientation, as specified.
- B. Install sealants in accordance with Section 07 92 00, and sealant manufacturer's instructions.
- C. Install glass into each frame type according each respective specification section and manufacturer requirements.

**3.04 CLEANING**

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

**3.05 PROTECTION OF FINISHED WORK**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

**3.06 SCHEDULE**

- A. Exterior openings and operable sashes: Sealed Insulating Glass Units.
- B. Interior openings: Single pane (Flat Glass); fixed sashes.
- C. Tempered Safety Glass: where required by OSSC or as shown on drawings.

**END OF SECTION**

## **GYPSUM BOARD ASSEMBLIES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Gypsum wallboard.
- B. Joint treatment and accessories.
- C. Textured finish system.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Building framing, blocking .

#### **1.03 REFERENCE STANDARDS**

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- C. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2010a.
- D. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2010.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing.

#### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum five years of documented experience.

### **PART 2 PRODUCTS**

#### **2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-6.

#### **2.02 BOARD MATERIALS**

- A. Gypsum Wallboard: ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
  - 1. Fire Resistant Type: Complying with Type X requirements; UL or WH rated.
    - a) Thickness: 5/8 inch.
    - b) Edges: Tapered.

#### **2.03 ACCESSORIES**

- A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.
  - 1. Types: As detailed or required for finished appearance.
- B. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
  - 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
  - 2. Ready-mixed vinyl-based joint compound.

- C. Textured Finish Materials: Latex-based compound; plain.
- D. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

#### **3.02 BOARD INSTALLATION**

- A. Comply with ASTM C 840 and manufacturer's instructions.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

#### **3.03 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.

#### **3.04 JOINT TREATMENT**

- A. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.
  - 1. Above Finished Ceilings Concealed From View: Level 1.
  - 2. Utility Areas and Areas Behind Cabinetry: Level 2.
  - 3. Walls and Ceilings to Receive Texture, Flat or Eggshell Paint Finish: Level 4.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.

#### **3.05 TEXTURE FINISH**

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions to match existing wall finish.
- B. Texture Required: Smooth - to match existing.

#### **3.06 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

**END OF SECTION**



## **NON-STRUCTURAL METAL FRAMING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Non-load-bearing steel framing systems for interior gypsum board assemblies.

#### **1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for each type of product.
- C. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by and agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies.
- D. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.

#### **1.03 QUALITY ASSURANCE**

- A. Contractor shall provide effective, full time quality control over all fabrication and erection complying with the pertinent codes and regulations of government agencies having jurisdiction. Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.

#### **1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Notify manufacturer of damaged materials received prior to installation.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice".

### **PART 2 PRODUCTS**

#### **2.01 PERFORMANCE/DESIGN CRITERIA**

- A. Design framing systems in accordance with American Iron and Steel Institute Publication "North American Specification for the Design of Cold-Formed Steel Framing – NonStructural Members", except as otherwise shown or specified.
- B. Design loads: As indicated on the Architectural Drawings or 5 PSF minimum as required by the International Building Code.

#### **2.02 FRAMING SYSTEMS**

- A. Framing Members, General: Comply with ASTM C 645 for sheet steel components and protective coatings. A40 galvanized products are not acceptable.
- B. Non-Structural Studs and Runners: Cold-formed galvanized steel C-studs, runner tracks, and drywall tracks in conformance with ASTM C 645.
  - 1. Flange Size: 1 1/4 inch (32mm).
  - 2. Web Depth: 3-5/8 inches (92 mm) Typical and as specified on Drawings. Track web to match stud web size
  - 3. Minimum Thickness: 0.0150 inches (0.3810 mm). Track thickness to match wall stud thickness or as per design.
- C. Steel Channel Bridging and Bracing, Headers and Jambs : Manufacturer's shapes compatible with studs and runners

**2.4 AUXILIARY MATERIALS**

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

**PART 3 - EXECUTION****3.1 EXAMINATION**

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

**3.2 PREPARATION****3.3 INSTALLATION, GENERAL**

- A. Installation Standard: ASTM C 754 and requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, handrails, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

**3.4 INSTALLING FRAMED ASSEMBLIES**

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a) Install two studs at each jamb unless otherwise indicated.
      - i. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
      - ii. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

**END OF SECTION**

## ACOUSTICAL PANEL CEILINGS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units for adhesive applied installations

#### 1.02 REFERENCE STANDARDS

- A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2013.
- C. ASTM E 580 - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- D. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 2008e1.
- E. OSSC - Oregon Structural Specialty Code

#### 1.03 QUALITY ASSURANCE

- A. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Single Source Responsibility: Obtain panel units for entire project from a single manufacturer.

#### 1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

#### 1.05 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustical units after interior wet work is dry.

#### 1.06 EXTRA MATERIALS

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Provide 5 percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project, not less than one carton per type of tile.

### PART 2 PRODUCTS

#### 2.01 ACOUSTICAL UNITS

- A. Manufacturers:
  1. Armstrong World Industries, Inc.
  2. Gold Bond.
  3. USG Interiors, Inc or approved.
  4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspended Grid Acoustical Units - ASTM E 1264, Class A, non-rated, color: white
  1. Armstrong Dune Second Look #2712, 24 inch x 48 inch x 3/4 inch (Visual appearance of 24 inch x 24 inch tiles), angled tegular edge profile, NRC 0.55, light reflectance 0.82.
- C. Glued Tiles - ASTM E 1264, Class A, non-rated, color: white

1. Armstrong Fine Fissured #741, 12 inch x 12 inch x ½ inch, beveled tongue and groove edge profile, NRC .55, light reflectance 0.85.

## 2.02 SUSPENSION SYSTEM

- A. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Non-rated.
- C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled, with painted finish.
  1. Profile: Tee; 15/16 inch wide face.
  2. Finish: White.
  3. Product: Prelude Exposed Tee by Armstrong World Industries or DONN Grid System DX by USG Interiors.

## 2.03 ACCESSORIES

- A. Suspended Grid System:
  1. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
  2. Ceiling Tile Restraint Clips: Manufacturer's standard clips for connecting tile to grid to resist seismic forces. Allow removal of tile.
  3. Touch-up Paint: Type and color to match acoustical and grid units.
- B. Adhesive System:
  1. Adhesive: Non-toxic, water-based adhesive - per manufacturer recommendations.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

### 3.02 PREPARATION

- A. Prior to installing ceiling panels, make certain that surface to which adhesive will be applied are clean and free of dust, dirt, and other residues that would inhibit a proper bond.

### 3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis or according to reflected ceiling plans.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

**3.04 INSTALLATION - ACOUSTICAL UNITS**

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units with pattern to match as illustrated on drawings.
- D. Fit border trim neatly against abutting surfaces.
- E. Install units after above-ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. Cutting Acoustical Units:
  - 1. Make field cut edges of same profile as factory edges at penetrations and perimeters.
- H. Where round obstructions occur, provide preformed closures to match perimeter molding.
- I. Install hold-down clips on panels within 20 ft of an exterior door.
- J. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- K. Glued Tiles:
  - 1. Apply adhesive to panels per manufacturer's recommended pattern and press panel firmly into place per manufacturer's installation requirements.
  - 2. Install panels true to lines and plane indicated.

**3.05 TOLERANCES**

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**END OF SECTION**



## **RESILIENT FLOORING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Rubber tile flooring.
- B. Rubber wall base.
- C. Installation accessories.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 02 41 00 - Demolition: Removal of existing floor finishes.

#### **1.03 REFERENCE STANDARDS**

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008.
- B. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plan.
- D. Verification Samples: Submit two samples, 6 x 6 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. MSDS: Submit for all adhesives used.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer: Provide resilient flooring manufactured by a firm with a minimum of 5 years' experience with resilient flooring of type's equivalent to those specified. Manufacturers proposed for use, which are not named in this section, shall submit evidence of ability to meet performance requirements specified not less than 10 days prior to bid date.
  - 1. Color Matching: Provide resilient flooring products, including wall base and accessories, from one manufacturer to ensure color matching.
  - 2. Provide subfloor preparation products including, membrane, primer, patch, leveler and adhesive systems from one manufacturer to ensure compatibility.
  - 3. Manufacturer must be capable of providing technical training and technical field service representation.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature prior to installation.

#### **1.06 FIELD CONDITIONS**

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

- B. Store materials for not less than 48 hours prior to installation in area of installation. Maintain temperature and humidity at service levels or 68° F (20° C),  $\pm 5^\circ$  F (3° C), and 50% RH  $\pm 10\%$  in areas to receive resilient flooring. Specified temperature shall be maintained at least 48 hours before, during, and 72 hours after installation.

### 1.07 WARRANTY

- A. Provide current, detailed manufacturer's warranty for each flooring product as applicable, including limited wear, defect and conductivity.

### 1.07 EXTRA MATERIALS

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Furnish full size units equal to 2 percent of quantity of resilient flooring installed and 10 linear feet of base of each type can color specified as extra materials. Properly label and package extra materials. Deliver to owners designated storage area.

## PART 2 PRODUCTS

### 2.01 RESILIENT TILE

- A. Rubber Tile Flooring - Typical: Homogeneous rubber compound wear layer, with color and pattern through wear layer thickness:
1. Minimum Requirements: Comply with ASTM F1344 Standard Specification for Rubber Floor Tile, defined as Type I and Grade 1.
  2. Material: Vulcanized rubber compound with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium or mercury.
  3. Back of Tile: Double-sanded smooth.
  4. Thickness: ~0.12 inches (3mm), ASTM F386,  $\pm 0.005$  inches ( $\pm 0.127$  mm)
  5. Tile Size: ~24 inches by 24 inches (610mm by 610mm), ASTM F2055,  $\pm 0.018$  ( $\pm 0.45$ mm)
  6. Surface: Smooth.
  7. Pattern: Random scattered design.
  8. Product:
    - a) noraplan sentica, Article 2701 by nora systems.
    - b) Substitutions: See Section 01 60 00 - Product Requirements.
    - c) Color: RBT-1: Silk, 6595 - confirm with Architect.
- B. Rubber Tile Flooring - Ramp: Homogeneous rubber compound wear layer, with color and pattern through wear layer thickness:
1. Minimum Requirements: Comply with ASTM F1344 Standard Specification for Rubber Floor Tile, defined as Type IB and Grade 2.
  2. Material: Vulcanized rubber compound with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium or mercury.
  3. Back of Tile: Double-sanded smooth.
  4. Thickness: ~0.14 inches (3.5mm), ASTM F386, + 0.015 inches/-0.005 inches (+0.381/- 0.127 mm)
  5. Tile Size: ~39.53 inches by 39.53 inches (1004mm by 1004mm), ASTM F2055,  $\pm 0.02$  ( $\pm 0.5$ mm)
  6. Surface: Hammered.
  7. Pattern: Random scattered design.
  8. Product:
    - a) norament satura, Article 1880 by nora systems.
    - b) Substitutions: See Section 01 60 00 - Product Requirements.
    - c) Color: RBT-2: Orion, 5109 - confirm with Architect
- C. Substrate Preparation: manufacturer's recommended products; this may consist of part, or all, of the following steps depending upon the project specifics:
- Step 1 – membrane
  - Step 2 – primer
  - Step 3 – leveler
  - Step 4 – patch



Step 5 – adhesives: usage and substrate conditions will determine the appropriate adhesive.

## 2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TP - rubber, thermoplastic; top set Style B, Cove, and as follows:
  - 1. Height: 4 inch to match existing.
  - 2. Thickness: 0.125 inch thick.
  - 3. Finish: Satin.
  - 4. Length: Roll.
  - 5. Product:
    - a) nora wall base, Article 820 by nora systems.
    - b) Substitutions: See Section 01 60 00 - Product Requirements.
    - c) Color: RB: Mocha, 6239 - confirm with Architect

## 2.03 ACCESSORIES

- A. Subfloor and Wall Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Vinyl, 1/8 inch under slung resilient floor reducer; color as selected.
  - 1. VT8 by Armstrong World Industries, Inc: [www.armstrong.com](http://www.armstrong.com).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.
- C. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- D. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
  - 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- E. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- F. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

### 3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- B. Fill voids in wall surfaces to provide smooth surface to receive base.
- C. Prohibit traffic until filler is cured.
- D. Clean substrate.

- E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

### **3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of sub-floor conditions
- B. Install resilient flooring, including but not limited to the following, in accordance with the manufacturer's instructions.
  1. Do not mix manufacturing batches of a color within the same area.
  2. Do not install resilient flooring over building expansion joints.
  3. Do not install defective or damaged resilient flooring.
  4. Layout resilient flooring to provide ~equal size at perimeter. Adjust layout as necessary to reduce the amount of resilient flooring which is cut to less than half full width.
  5. Lay resilient flooring with arrows in the same direction (excluding borders).
  6. Spread only enough adhesive to permit installation of materials before initial set.
  7. Install resilient flooring without voids at seams. Lay seams together without stress.
  8. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
  9. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
  10. Cut/scribe resilient flooring neatly at perimeter and obstructions, including walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
  11. Extend resilient flooring into reveals, closets, and similar openings.
  12. Remove excess adhesive immediately.
  13. Install reducer strips at exposed edges.
- C. Have the flooring cleaned no sooner than 72 hours after the installation.

### **3.05 RESILIENT BASE**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.

### **3.06 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's instructions.
- C. Clean and seal resilient flooring products in accordance with manufacturer's instructions.

### **3.07 PROTECTION**

- A. Prevent all traffic for a minimum of 48 hours and rolling loads for 72 hours after installation.

**END OF SECTION**

**TILE CARPETING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Carpet tile, loose laid with edges and control grid adhered.

**1.02 RELATED SECTIONS**

- A. Section 09 65 00 - Resilient Flooring.

**1.03 REFERENCES**

- A. ASTM D 2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (2011).
- B. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.
- C. CRI 104 - Standard for Installation of Commercial Textile Floorcovering Materials; Carpet and Rug Institute; 2002.
- D. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.
- E. CRI (GLC) - Green Label Testing Program - Approved Product Categories for Carpet; Carpet and Rug Institute; Current Edition.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout of joints.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples: Submit two carpet samples illustrating color and pattern design for each carpet color selected.
- E. Maintenance Data: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

**1.05 ENVIRONMENTAL REQUIREMENTS**

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

**1.06 EXTRA MATERIALS**

- A. Provide a quantity equal to 5% of the total of all of the carpet tile of each color and pattern used on the project. Store where directed, in un-opened cartons.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Carpet tile
  - 1. Interface, Inc.: [www.interface.com](http://www.interface.com).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. CPT-1: Carpet Tile: Tufted Textured Loop, manufactured in one color dye lot.
  - 1. Tile Size: 19.7 x 19.7 inch (500 x 500 mm), nominal.
  - 2. Color: Satin/Accent, 102415.
  - 3. Pattern: Brick.

**2.02 ACCESSORIES**

- A. Rubber Base – See Section 09 65 00 – Resilient Flooring.
- B. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- C. Transition Strips: Rubber CTA-XX-A by Johnsonite, or approved equal. Color: Brown, 47.
- D. Contact Adhesive: Acceptable to carpet tile manufacturer, compatible with carpet material, releasable type. Maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified in Section 03 30 00 and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.
- C. Verify that required floor-mounted utilities are in correct locations.

**3.02 PREPARATION**

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.

**3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions, CRI Carpet Installation Standard, and CRI 104, with manufacturer approved adhesive.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in brick pattern, with pile direction to be determined by Architect, set parallel to building lines, unless otherwise shown on drawings.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Adhere carpet tile to substrate along centerline of rooms, at perimeter of rooms, where tiles are cut, and at 15 foot (4.5 m) intervals throughout rooms. Lay remainder of tile dry over substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

**3.04 CLEANING & PROTECTION**

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.
- C. Prohibit traffic on carpet installation for 48 hours after installation.

**END OF SECTION**

## PAINTING AND COATING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished
- D. Do Not Paint or Finish the Following Items:
  - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Glass.
  - 6. Concealed pipes, ducts, and conduits.
- E. See Schedule - Surfaces to be Finished, at end of Section.

#### 1.02 REFERENCE STANDARDS

- A. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

#### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Samples: Submit two paper chip samples, 8-1/2 x 11 inch in size illustrating range of colors available for each surface finishing product scheduled.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.

#### 1.05 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 10 feet long by 10 feet wide, illustrating special coating color, texture, and finish.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

**1.07 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

**1.08 EXTRA MATERIALS**

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Supply 1 gallon of each color; store where directed.
- C. Label each container with color in addition to the manufacturer's label.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 PAINTS AND COATINGS - GENERAL**

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
  - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
  - 3. Supply each coating material in quantity required to complete entire project's work from a single production run.
  - 4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Colors: To be selected from manufacturer's full range of available colors.
  - 1. Selection to be made by Architect after award of contract.

**2.03 PAINTS AND COATINGS**

- A. Metal Fabrications - Interior Primer:
  - 1. First Coat by Rodda.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Wood Trim - Interior Primer:
  - 1. Unique Enamel Undercoat by Rodda.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

- C. Gypsum Board - Interior Primer:
  1. Scotseal by Rodda.
  2. Substitutions: See Section 01 60 00 - Product Requirements.
- D. General - Interior Acrylic Latex Enamel:
  1. Unique II Semi Gloss by Rodda.
  2. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Steel Column - Interior Lacquer:
  1. Old Masters Brushing Lacquer 928 Semi-Gloss by Old Masters.
  2. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Glulam Beam - Interior Stain:
  1. Arborcoat Transparent Deck and Siding Stain 637 by Benjamin Moore; Ready Mix.
  2. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Doors - Interior Varnish:
  1. Cat-A-Lac Clear Finish, by Rodda.
  2. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

#### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.
- E. Seal surfaces that might cause bleed through or staining of topcoat.

- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- H. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- I. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- J. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

### 3.03 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### 3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

### 3.05 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
  1. Items fully factory-finished unless specifically noted.
  2. Fire rating labels, equipment serial number and capacity labels.
  3. Stainless steel items.
- B. Paint the surfaces described below under Schedule - Paint Systems.
- C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
  1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
  2. Paint shop-primed items occurring in finished areas.
  3. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
  4. Paint dampers exposed behind louvers, grilles, to match face panels.

### 3.06 SCHEDULE - INTERIOR

- A. Exposed Metal - Painted:
  1. Prepare surfaces in accordance with coating manufacturer's recommendations.
  2. Touch-up shop primer as necessary; field prime non shop-primed metal.
  3. Two coats of interior acrylic latex enamel, semi-gloss.
  4. Colors: Per color schedule in drawings.



- B. Gypsum Board Walls:
  - 1. Prepare surfaces in accordance with coating manufacturer's recommendations.
  - 2. One coat interior primer.
  - 3. Two coats of interior acrylic latex enamel, semi-gloss.
  - 4. Colors: Per color schedule in drawings.
- C. Painted Wood Doors and Trim:
  - 1. Prepare surfaces in accordance with coating manufacturer's recommendations.
  - 2. One coat interior primer.
  - 3. Two coats of interior acrylic latex enamel, semi-gloss.
  - 4. Colors: Per color schedule in drawings.
- D. Clear Wood Doors:
  - 1. Prepare surfaces in accordance with coating manufacturer's recommendations.
  - 2. Two coats of varnish.
- E. Exposed Steel Column - Clear finish:
  - 1. Prepare surfaces in accordance with coating manufacturer's recommendations.
  - 2. Steel to be brushed to achieve raw, metallic shine.
  - 3. Three coats of lacquer.
- F. Exposed Glulam Beam:
  - 1. Prepare surfaces in accordance with coating manufacturer's recommendations.
  - 2. Two coats of stain.
  - 3. Colors: Per color schedule in drawings.
- G. Existing Surfaces:
  - 1. Prepare surfaces in accordance with coating manufacturer's recommendations.
  - 2. Touch-up primer as necessary.
  - 3. Two coats of interior acrylic latex enamel, gloss to match existing.
  - 4. Colors: Per color schedule in drawings.

**END OF SECTION**



## Section 15050

### Basic Mechanical Requirements

#### PART 1 -- GENERAL

##### 1.1 WORK INCLUDED

- A. This Section specifies the basic requirements for all Contractor-installed equipment. It applies to all sections included in Division 15.
- B. Requirements for the following are included:
  - 1. Related work (other Contract Documents and Specification Sections) which must be combined with the requirements of this Section.
  - 2. Design criteria.
  - 3. Regulatory requirements.
  - 4. Delivery, storage, and handling.
  - 5. Submittals.
  - 6. Product quality, basic type, and finishes.
  - 7. Equipment identification.
  - 8. Installation.
  - 9. Mounting and shimming.
  - 10. Inspection.
  - 11. Safety considerations.
  - 12. Cleaning, startup, and adjustments.
  - 13. Chemical treatment.
  - 14. Record drawings.
  - 15. Training requirements.

##### 1.2 RELATED WORK

- A. This general section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for the project equipment and systems.
  - 1. Instructions to the bidders.
  - 2. Division 1 sections included in project specifications.
- B. CAUTION: Use of this Section without including all of the above-listed items will result in omission of basic requirements.

##### 1.3 DESIGN CRITERIA

- A. Project Site Design Conditions:
  - 1. Temperature - Outdoors:

- a. Summer: 92 degrees F (dry bulb) / 67 degrees F (wet bulb).
  - b. Winter: 17 degrees F, 15 mph wind
  2. Temperature – Indoors:
    - a. Summer: 76 degrees F, no humidity control.
    - b. Winter: 68 degrees F, no humidity control.
  3. Seismic Load: (current Oregon Structural Specialty Code),  $I = 1.25$ , Site Class D,  $S_{MS} = 1.15$ ,  $S_{DS} = 0.77$ .
  4. SMACNA SHL: Level A or OSSC value, whichever is greater.
  5. Altitude: 365 feet MSL.
  6. Wind Load (current OSSC): 85 mph, Exposure C.
  7. Snow Load (current OSSC): 25 pounds per square foot, plus drift.
  8. Rainfall Basis: 3 inches per hour.
- B. Compliance with the provisions of this Specification does not relieve the Contractor of the responsibilities of furnishing equipment and materials of proper design, mechanically suited to meet operating guarantees at the specified service conditions.
- C. The flange facing for all nozzles, manways, handholes, and equipment body joints shall be correct for the type of gasket provided. Ordinary compressed sheet gaskets require only the standard machine finish on the raised face. Smooth metal gaskets, either plain or filled, require a fine serrated finish. Corrugated metal and spirally wound metal gaskets, either plain or filled, require a smooth finish (125 AARH or 125 rms) for proper applications. All ring-type joint gaskets and gasket grooves shall conform to ANSI B16.20.
- D. Pipe sizes and equipment nozzle sizes of 3 1/2 inches and 5 inches shall not be used.

#### 1.4 REGULATORY REQUIREMENTS

- A. Conformance to the latest codes and other regulatory requirements is the responsibility of the Contractor.
- B. Seismic design of equipment, piping, and ductwork supports and restraints shall be in accordance with the details on drawings. Submit sealed calculations by a registered civil or structural engineer in the state of Oregon in accordance with Section 01061 - Design/Build Requirements and Section 01340 – Shop Drawings, Product Data, Samples.
- C. The Contractor shall obtain all permits and arrange all inspections required by codes applicable to this Section and shall submit written evidence to the Engineer that required permits, inspections, and code requirements have been secured.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipment:

1. Each unit shall be suitably prepared for the shipment specified and for outdoor storage for a period of at least 6 months in a manner requiring no disassembly prior to operation.
2. The Contractor shall be solely responsible for the adequacy of the preparation for shipment provisions employed with respect to materials and application.
3. All flange facings shall be protected by securely fastened durable covers to prevent damage during shipment.
4. Equipment shall be completely free of water prior to any shipment preparation.
5. Exposed finished and machined surfaces, including bolting, shall be given a heavy coating of rust-inhibiting compound. Only internal metal surfaces which are subject to corrosion shall be protected. Use of rust inhibitors or preventative shall only be used with the approval of the Engineer.
6. Bearings, bearing housings, and oil systems, including reservoirs, coolers, filters, and piping, shall be thoroughly cleaned internally of metal particles, dirt and debris, and coated with a suitable rust preventative prior to shipment.
7. Adequate protection shall be provided against mechanical damage and atmospheric corrosion in transit.
8. All instruments and valves, including auxiliary systems, must be securely mounted and/or supported to eliminate damage during shipment, storage, operation, and maintenance.
9. Supports and rigging connections shall be provided to prevent damage during transit, lifting or unloading.
10. Threaded connections shall be provided with a pipe plug of the same material as the connections (except cast iron connections shall have steel plugs). Plugs shall have a square or hex head. Teflon tape shall be used as a thread sealant.
11. Those openings that require rust preventative shall be suitably tagged to indicate the type and nomenclature of the rust preventative used. Rust prevention shall only be used with the Engineer's approval.
12. Equipment containing insulating oils or other fluids shall be suitably tagged at openings to indicate the nature of the contents, and shipping and storage precautions.
13. Open ends of tubes and pipe shall be capped (just taping is not adequate) for protection.
14. All equipment shall be packed, securely anchored (skid mounted when required) and weather protected for the shipment method called for in the purchase order. Separate, loose, or spare parts shall be boxed and each part individually protected as required. Each individual container shall be marked both inside and outside with the equipment number and service for which the parts are intended.
15. One complete set of installations, operating, and maintenance instructions shall be packed and shipped with the equipment. This set is in addition to the sets which are to be sent directly to the Owner.
16. Each container shall also include a complete bill of materials identifying each part. In some instances, such as instruments, specific tagging shall be required.

17. Piping connections furnished on the purchased equipment shall be impression stamped to agree with manufacturer's connection table listed on the general arrangement drawing. Tagging in lieu of stamping is only acceptable where the connections, because of size or geometry, cannot be impression stamped.

## 1.6 SUBMITTALS

- A. Provide the following information in addition to the standard requirements:
  1. Proposal Information:
    - a. A delivery schedule for each equipment number.
    - b. The length of time required for certification of all information, drawings, etc.
    - c. Estimated equipment weight and support requirements.
    - d. Electrical power requirements, including in-rush current and recommended fuse size.
    - e. Utility (cooling water, air, fuel, etc.) requirements.
  2. Drawings and Data Within 2 Weeks of Receipt of Order - Composite outline drawings, including the following, are required:
    - a. Certified Correct Dimensional Drawings of Completed Assembled Units, Which Shall Show:
      - 1) Identification data for equipment components.
      - 2) Rotation.
      - 3) Weight.
      - 4) Adequate dimensional data to permit the design of foundation, piping, and wiring connections.
      - 5) Location of motor junction box(es).
      - 6) Piping connections identified with the size, rating, and facing indicated.
      - 7) Clearance required for disassembly and maintenance.
    - b. Identify auxiliary connections on the composite outline drawing as follows:
      - 1) "Not furnished this order".
      - 2) "Not drilled this order".
      - 3) "Plugged, requires field piping by Contractor".
      - 4) "Plugged, not required this order".
      - 5) "Piped by manufacturer".
    - c. Reference to Any Supplementary Drawings Required to Complete Any Auxiliary Piping: Review of manufacturer's drawings shall not relieve the Contractor from responsibility for equipment performance and compliance with this Specification.
    - d. Material safety data sheets for paints, lubricants, refrigerants, liquids, and materials used in the manufacture, testing, operation, and maintenance of equipment. Material safety data sheets shall contain information mandated by federal regulation.

## PART 2 -- PRODUCTS

## 2.1 GENERAL

- A. All equipment shall be the manufacturer's most recent standard design. Equipment designs which have not been previously used successfully in an industrial application are not acceptable.
- B. Unless specifically detailed within each equipment specification, provide 1 quart and two spray cans of each standard paint used from each equipment and/or materials supplier for touchup. All paint cans are to be adequately labeled to identify where they are to be used. When equipment is involved, the label must, at a minimum, include the Owner's equipment tag number.

## 2.2 EQUIPMENT IDENTIFICATION

- A. All equipment shall have a stainless steel identification tag pinned in place in a readily accessible location with the following information at a minimum (when applicable):
  - 1. Manufacturer's name.
  - 2. Manufacturer's model number.
  - 3. Date of manufacture.
  - 4. Design operating conditions.
  - 5. Design pressure and temperature.
  - 6. Serial number.
  - 7. Materials of construction.
  - 8. Code stamp.
  - 9. rpm.
  - 10. Electrical power requirements.

## PART 3 -- EXECUTION

### 3.1 INSTALLATION

- A. Installation shall be in accordance with the requirements of the equipment manufacturer.
- B. Equipment Manufacturer's Responsibility and Services:
  - 1. A manufacturer's representative for major equipment and operating systems shall be provided as necessary to assist the Contractor during installation and to provide written certification that the equipment has been installed as specified and in accordance with the manufacturer's requirements.
  - 2. The manufacturer's representative shall provide the initial startup of equipment in the presence of the Engineer and Owner's Authorized Representative.
    - a. Provide a prestart check of all piping, valves, control devices, control panels, and equipment.
    - b. Calibrate and adjust equipment and controls for operation at the specified design conditions.

- c. Provide a record of all startup events noting problems and their resolution.
- d. Provide a record of all set points for operational controls and devices.
3. Upon the completion of equipment startup, provide instructional time with the Owner's personnel to review the operations and maintenance manuals and perform each step necessary for startup, shutdown, troubleshooting, and routine maintenance. The instructional time shall be scheduled through the Owner's Authorized Representative.
4. Upon completion of the inspections, startup, testing, and checkout procedures, the equipment manufacturer shall submit written notice to the Owner's Authorized Representative and the Engineer that the units are ready for use by the Owner.

### 3.2 MOUNTING AND SHIMMING

- A. Mount equipment as shown on the Drawings unless provisions for mounting special equipment on spring isolators, snubbers, and inertia bases are specified in Section 15240, Vibration Isolation and Balance.
- B. Level the equipment by means of steel wedges (steel plates and steel shims). Wedge taper shall not be greater than 1/4 inch per foot. Use double wedges to provide a level bearing surface for the equipment. Service each pair of wedges in their final positions with one tack weld on each side after leveling is complete. Wedging shall be executed in a manner that will prevent a change in level or springing of the baseplate when the anchor bolts are tightened.
  1. Adjust rotating equipment assemblies such that the driving units are properly aligned, plumb, and level with the driven units and all interconnecting shafts and couplings.
  2. All rotating equipment shall be checked for proper alignment with dial indicators. The alignment must be within the tolerances required by the equipment manufacturer. The final alignment check shall be witnessed by the Engineer.
- C. Grouting: After the equipment has been set in position, aligned, and shimmed to the proper elevations, grout the space between the bottom of the baseplate and the concrete foundation and/or inertia base with a poured non-shrinking grout, as specified on the structural drawings.

### 3.3 INSPECTION

- A. The Contractor shall inspect the work to ensure the installation and workmanship are in accordance with these Specifications and acceptable industry standards for the work being done.
- B. The extent of testing, whether witnessed or not, is listed in the individual data sheets. Such testing may include full and/or part load performance tests, basic mechanical spin tests, etc. It may also include various nondestructive tests as required by specified



codes, including those normally required by the manufacturer's own manufacturing standards.

- C. It is a requirement of this Specification that the Engineer's inspection work be minimized by assigning to the Contractor the responsibility of furnishing the inspector with all necessary material certifications, shop test data, radiographic plates and the like necessary to verify the Contractor's compliance with the Specifications for all Contractor-furnished equipment.
- D. Where shop inspection is specified, no surfaces or parts are to be painted until the inspection is complete.
- E. All materials, equipment, and workmanship shall be subject to inspection at any time by the Owner or his representatives. Contractor shall correct any work, materials, or equipment not in accordance with the Contract Documents.

#### 3.4 SAFETY CONSIDERATIONS

- A. Install equipment with suitable access clearances for maintenance or removal of replaceable parts and components, and with necessary unions or flanges, to perform the maintenance or removal without removing the connecting appurtenances.
- B. Where equipment requiring periodic maintenance cannot be reached by normal walkways because of interference with ductwork, piping, or other obstructions, provide an alternate safe means of access. These may include construction of an overhead platform with stairway or ladder ends and safety railings or handholds, or walk-through duct plenums with hinged access doors, or as required to meet OSHA standards for safe maintenance procedures.

#### 3.5 PRELIMINARY OPERATION

- A. Should the Owner's Authorized Representative request through the Engineer that any portion of the plant, apparatus, or equipment be operated prior to final completion and acceptance of work, the Contractor shall consent, and such operation shall be considered as substantial completion for that portion of the work. Equipment or system boundaries will be clearly defined for such work accepted.

#### 3.6 STARTUP SERVICES

- A. Prior to startup, ensure the systems are ready, including, but not limited to, the following: proper equipment rotation, the systems are flushed and clean, proper wiring, auxiliary connections, lubrication, venting, controls, all filters and strainers installed, and properly set relief and safety valves.
- B. All electrical testing must be complete and test results submitted before equipment startup to avoid power interruptions during mechanical equipment startup and testing.

- C. The Contractor shall submit at least 60 days in advance a schedule listing the date of completion of the work as it will be ready for equipment startup. This schedule shall include work on a system-by-system basis.
1. Two weeks prior to the startup of any major equipment, the Contractor shall certify in writing that the systems will be complete and ready for startup. Completeness shall not only include physical installation of individual pieces of equipment, but all related elements of other crafts to make all equipment operate as a system. The startup check list will cover all related crafts (e.g., controls, electrical, mechanical) and a clean environment for equipment startup.
  2. The Contractor shall schedule a tour with the Owner's Authorized Representative and the Engineer to review startup conditions prior to equipment startup. This tour shall take place during the associated consultant's regularly scheduled visit. This tour does not relieve the Contractor of any responsibilities to properly start equipment. The Engineer will issue a notice of deficiencies that will be required to be corrected prior to equipment startup. The Contractor will be required to reschedule a back check with the Engineer prior to attempting an equipment startup and provide verification of the manufacturer's representative being present at equipment startup.
- D. Start and operate all systems: Provide the services of factory-trained technicians for startup of major equipment and systems.
- E. Equipment or systems should not be started until systems are completed and/or when other continuing work could possibly damage completed systems if they are in operation.
- F. Systems Startup and Operation:
1. The Contractor shall provide all labor, materials, and services necessary for the initial startup and operation of all systems and equipment furnished and installed under this Section.
  2. The Contractor shall provide the services of qualified factory representatives for all major equipment pre-start setup, startup, and initial operation. Such periods shall be sufficient to ensure the proper operation of systems and equipment.
  3. The Contractor and the factory representative shall check all equipment during the initial startup to ensure correct rotation, proper lubrication, adequate fluids or airflows, non-overloading electrical characteristics, proper alignment, and vibration isolation. Systems shall be checked for air and/or water flows throughout without blockages. Air-handling systems shall be checked for proper damper connections and positions, aligned and adjusted belt drives, proper lubrication, temporary air filters installed, non-excessive electrical characteristics, and minimal vibration. Other miscellaneous equipment shall be started and operated as described above, as applicable.
  4. After initial startup and operation of system, the Contractor shall submit a pre-balance report, as specified in Section 15952, before commencement of the final 72-hour test.

5. During initial operation of the system and until substantial completion, qualified personnel shall be provided and designated for maintaining the equipment and systems in good running order. Items such as strainer, cleanout, filter replacement, bearing lubrication, packing replacement, and other consumables shall be provided without cost to the Owner. Failure of equipment during this period due to lack of proper supervision is the responsibility of the Contractor, and continued failures shall be grounds for the Owner to provide such services with back charges to Contractor.
- G. 72-Hour Test:
1. Provide all labor, equipment, and materials required to perform test.
  2. The test shall occur after equipment startup and pre-balance services have been performed as specified in this Section and Section 15952. The purpose is to demonstrate that individual pieces of equipment and all related elements operate as one complete system and not to identify incomplete or defective work.
  3. All equipment is to be run in automatic operating position and exercised for 72 hours to verify that performance is in accordance with the specified sequence of operation and designed operation logic.
  4. The Engineer shall be present for the test.
  5. A log shall be prepared by the Contractor to be submitted to the Engineer of all tests including, but not limited to: time, temperatures, pressures, and other readings to prove all equipment is operating as specified.
  6. All temperatures, pressures, status indication, etc., shall be verified by at least one other means of measurement or visual verification of condition.
  7. Change set points and simulate conditions as directed to demonstrate:
    - a. Ability to control new set point.
    - b. Interface between systems.
    - c. Proper sequence and operation.
    - d. Equipment safety systems and all automatic changeover backup systems and alarms.
    - e. If unsatisfactory performance or a system failure is experienced for any reason, the tests shall be repeated until 72 consecutive hours are achieved. The Engineer shall make all final decisions on a satisfactory test.
- H. Additional Testing: See the technical sections for additional requirements.

### 3.7 RECORD DRAWINGS

- A. Contractor shall provide record drawings which shall clearly show all differences between the Contract work as drawn and as installed, as well as work added to the Contract which is not shown on the Contract Drawings.
- B. Contractor shall maintain a set of record drawings at the jobsite. These shall be kept legible and current and shall be available for inspection at all times by the Engineer.

Show all changes in the Contract work, or work added, on these record drawings in a contrasting color.

- C. Prepare separate sets of record drawings for the plumbing, heating, air conditioning, and fire protection work.
- D. In showing changes in the work, or added work, use the same legends as used on the Contract Drawings. Indicate exact locations by dimensions and exact elevations AFF. Give dimensions from a permanent point. Give elevations fire protection, sewer, and storm drainage lines to the invert elevation.
- E. Mechanical record drawings shall indicate exact routing of all piping, ductwork, power control wiring, etc., location and function of all controls, and whether manual or automatic, and normal amperage readings for all motors taken at the equipment under normal load conditions.
- F. Include dimensions of all underground utilities taken from buildings, curbs, or other visible, permanent surface features that are suitable as reference points. Note invert elevations. Note dimensions and inverts even if installed as located on Drawings.
- G. Observe the following guidelines for recording deviations:
  - 1. If dimensioned items are moved, record the new dimension.
  - 2. If items shown by scale only are moved by a scaled dimension more than 1 foot at 1/8-inch scale, then record the exact dimensioned location.
- H. Record drawings shall contain the names, addresses, and phone numbers of the Subcontractor and shall be signed by the Contractor.
- I. Engineer shall review the record drawings, and he shall be the sole judge of the acceptability of these drawings.

### 3.8 TRAINING REQUIREMENTS

- A. Before the completion of the facility, the Contractor shall arrange a meeting with the representatives of key system manufacturers, the Engineer, the Contractor's startup personnel, and the Owner's Authorized Representative to coordinate the startup activities of all operating systems.
  - 1. The Contractor shall submit, at least 60 days in advance, a schedule listing proposed training schedule for each system to the Engineer for review by the Engineer and Owner's Authorized Representative under the following conditions:
    - a. Maintenance manuals are complete and accepted by the user a minimum of 10 working days prior to any training.
    - b. Training will be scheduled for complete systems, not individual pieces of equipment.
    - c. Training schedule will be submitted to the Engineer and approved by the Owner's Authorized Representative.

2. The Contractor shall certify in writing 10 days prior to the training date that the systems are complete and operational with a list of any exceptions from a complete system.
3. Operation and Maintenance Training Requirements:

System	Minimum Hours
Fire protection	4
Makeup air distribution system	4
Chilled water system	4
Dust collection system	8
Air handler	8
Exhaust fan	4
ULF hoods	8
Plumbing	4
Hydronic heating system	4
Recirculation air-handling units	16
Exhaust systems	12

Refer to specific equipment specifications for detailed training requirements. If training time listed in equipment specifications is greater than the minimum time listed above, provide the greater amount of training time.

END OF SECTION



## Section 15059 Piping Schedule Table

FLOW STREAM			SYSTEM DESIGN RATING (3) MAX / MIN		COMPLIANCE		PIPING				HIGH PRESSURE LEAK TEST		
ID	SERVICE	LABEL COLOR (1)	PRESS (psig)	TEMP (deg F)	CODE (2)	FLUID	SIZE RANGE	SECTION	MATERIAL	CLASS	PRESS / TIME (psi/hr)	TEST MEDIA	LEAK TEST (4)
CD	CONDENSATE DRAIN	W ON B	15	75	PLUMBING	NA	≤ 2-1/2"	15061	COPPER	IDC	20 FT HD / 8	WATER	PL,VL

Notes:

1. Label Color Legend:

- W on B = White text on blue background
- W on G = White text on green background
- W on R = White text on red background
- B on Y = Black text on yellow background

2. Code is ANSI / ASME unless otherwise indicated.

3. These A72 conditions are concurrent and cannot be taken as individual maximums.

4. Leak tests: VL – Visible leak, PL – Pressure loss, VH – Vacuum helium leak test, SB – Soap bubble test, DL – Drop in level, C – NFPA code.

END OF SECTION





## Section 15060

### Pipe and Pipe Fittings - General

#### PART 1 -- GENERAL

##### 1.1 WORK INCLUDED

- A. This Section specifies the requirements to furnish and install the plant piping systems specified in the pipe class specification sheets and in the individual piping system specifications provided hereinafter. The work shall include, but not be limited to, all pipe, tubing, hangers, supports, restraints, isolators, pipe cleaning, testing, and cleaning. In addition, this Section covers the installation of all in-line valves and instruments and piping specialties.
- B. Piping Class System Description: Table 1, Line Class Designations.

##### 1.2 RELATED SPECIFICATIONS

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for the project piping systems:
  - 1. Section 15050 - Basic Mechanical Requirements.
  - 2. Section 15059 - Piping Schedule Table.
  - 3. Section 15080 - Copper Tubing Systems.
- B. CAUTION: Use of this Section without including all of the above-listed sections will result in omission of basic requirements.

##### 1.3 QUALITY ASSURANCE

- A. Manufacturer shall maintain a program to monitor the manufacturing process, in-process product quality, and final product quality. The program shall have the following features:
  - 1. A change control process.
  - 2. Standard manufacturing procedures.
  - 3. Standard calibration and test methods.
  - 4. Calibration records.
  - 5. Calibration standard traceability.
  - 6. A sampling plan.
  - 7. Test records.
  - 8. Documentation of upset conditions and corrective actions.

**PART 2 -- PRODUCTS****2.1 PIPE CLASS**

- A. The pipe class specification sheets provided at the end of each detail piping system specification specify the pipe, fittings, bolts, gaskets, and miscellaneous materials required for each pipe class. A three-letter code is used. The first letter identifies the pipe material, the second letter designates the system pressure rating, and the third letter indicates the type of connection or special service requirements (see Table 1 at the end of this Section).

**2.2 INSULATING FLANGES, COUPLINGS, AND UNIONS**

- A. Insulating flanges, couplings, or unions shall be provided wherever copper and ferrous metal piping are connected, wherever cathodically protected steel lines enter buildings, wherever new galvanized pipe is connected to existing galvanized pipe, and where shown on the Drawings.
- B. Acceptable manufacturers of insulating flanges and unions are Epco and Capitol Insulation Unions. Insulating couplings shall be Dresser STAB-39, R. H. Baker Series 216. Dielectric waterways shall be Victaulic "Clearflow" type, Style 47-TT

**2.3 SERVICE SADDLES**

- A. General: Service saddles may be used only when allowed in the applicable detail piping system specification or specifically reviewed in advance by the Engineer.
- B. Service Saddles for Ferrous Metal Piping: Pipe service saddles for all ferrous metal piping except stainless steel shall be Rockwell Series 313 or 366, Dresser Style 91. Service saddles shall be capable of withstanding 150-psi internal pressure without leakage or overstressing. The run diameter shall be compatible with the outside diameter of the pipe on which the saddle is installed. Taps shall have American National pipe threads. Saddles shall have malleable or ductile iron bodies and galvanized steel straps, steel hex nuts with washers, and neoprene seals. Service saddles shall be of double-strap design.
- C. Service Saddles for Plastic Pipe: Service saddles for CPVC, PVC, polypropylene, and PVDF pipe shall have solid polypropylene bodies with EPDM seals and stainless steel worm drive clamps, or polypropylene threaded inserts with vinyl-coated steel saddle bodies and stainless steel bolts or as otherwise designated. Saddles shall be Rockwell Style 342 or 352, Dresser Style 194.

#### 2.4 AIR VENTS AND LOW-POINT DRAINS

- A. Water line vents and drains are to be installed at all high and low points in the piping. The Contractor shall add such items as found to be necessary during detail piping design and/or piping installation.
- B. Unless detailed otherwise on the Drawings, vent the high point and drain the low point with 3/4-inch ball valves on those pipelines 2 1/2 inches and larger and 1/2-inch ball valves on those pipelines 2 inches and smaller. Each drain or vent valve shall be plugged with a pipe plug.

#### 2.5 FLOW SENSORS

- A. Piping adjacent to flow sensors shall be installed in accordance with the requirements of the manufacturer of the flow sensor and commonly accepted design practices.

#### 2.6 SAFETY CONSIDERATIONS

- A. All piping that must be installed across aisles or other main access walkways shall be covered with a protective checkered plate steel ramp, pitched a maximum of 2:12 to allow safe wheeled or foot traffic, and painted with a prime coat and two finish coats of safety yellow. Ramp shall be supported from the floor and shall not rest directly on the pipe.
- B. No liquid piping shall be installed immediately over or within a 3-foot plan view clearance of any electrical panel, motor starter, or control panel. Where piping must be located within these zones, either install piping inside a PVC conduit or shield the electrical device to prevent direct liquid access to electrical equipment.

### PART 3 -- EXECUTION

#### 3.1 DRAWINGS

- A. Spool drawings indicate the complete line, showing all welded and assembly items except for insulation shoes or nonstress-relieved lines.
- B. Except for ring joint flanges, dimensions are to the centerline of pipe and the contact face of flanges. This includes the contact face of male and female tongue and groove flanges. Ring joint flanges are dimensioned to the centerline of pipe and to the extreme face of the flange and not to the contact surface of the groove.
- C. Reducers are concentric unless otherwise noted.
- D. Flanges:

1. Flange bolt holes are to be oriented as follows, unless otherwise indicated on the spool drawings.
    - a. Flange Face Vertical: Bolt holes to straddle the vertical centerlines.
    - b. Flange Face Horizontal: Bolt holes to straddle plant north-south centerlines.
  2. Welds at orifice flanges shall have internal surfaces ground smooth to the pipe wall.
  3. Slip-on flanges shall be welded inside and outside. There shall be a distance of approximately 1/16 to 1/8 inch between the edge of the fillet weld and the face of the flange. The seal weld shall be applied so that the flange face shall be free of weld spatter and does not require refacing.
  4. Use flat-faced flanges when mating to Class 125 flanges. Use full-face gaskets with flat-faced flanges and ring gaskets with raised faced flanges.
  5. Weld neck flanges shall be used with butt-weld fittings.
  6. Flange bolts shall be torqued to the minimum value required by the manufacturer of the gasket material specified.
  7. The bore of weld neck flanges shall match the pipe wall thickness.
- E. Seal Welding:
1. When seal welding is required, connections shall be made without using sealing compound or Teflon tape.
  2. Do not seal weld threaded joints that have failed a pressure test unless all thread compound and Teflon tape have been removed.
  3. Seal welds of threaded connections shall cover all exposed threads.
- F. Bolts: All bolt threads are to be coated with Never-Seez (Catalog No. NSBT-16) prior to being made up with nuts unless otherwise specified in the detail piping system specifications or pipe class specification sheets. Alternate coating shall be used only with prior review of the Engineer.
- G. Piping Expansion and Flexibility:
1. Allow for pipe expansion in mains, runouts, and risers by means of natural flexibility in piping swing joints and by expansion loops where indicated on the Drawings.
  2. All piping shall be installed with sufficient flexibility to avoid or minimize the use of flexible couplings or expansion joints. Flexible couplings or expansion joints shall be provided for piping connections to equipment where shown. Use of additional flexible couplings or expansion joints, other than those indicated on the piping drawings, requires prior review of the Engineer.
  3. All piping shall be provided with earthquake seismic restraints suitably designed for the Seismic Zone 3, Importance Factor 1.5. Prefabricated seismic restraints meeting the requirements may be used.
  4. Lateral supports for seismic loads shall be provided at all changes in direction.
- H. Dimensional Tolerances:
1. These tolerances apply to in-line items and connections for other lines.

2. General Dimensions, Such as Face to Face, Face on End to End, Face or End to Center, and Center to Center: plus or minus 1/8 inch.
  3. Inclination of Flange Face from True in any Direction: 3/64 inch per foot.
  4. Rotation of flange bolt holes shall not exceed 1/16 inch.
- I. General Considerations:
1. All instruments and specialty items shall be installed according to the manufacturer's instructions and with sufficient clearance and access for ease of operation and maintenance.
  2. Connections to equipment shall be by use of flanges or unions as required by the piping specifications.
  3. Isolation valves provided for equipment and instruments shall be located in a manner which will allow ease of access and removal of the items to be isolated.
  4. Piping shall be installed without springing or forcing the pipe in a manner which would set up stresses in the pipe, valves, or connected equipment.
  5. Where piping connects to equipment, it shall be supported by a pipe support and not by the equipment.
  6. Piping shall be in conformance with the requirements of Section 15140, Piping Supports and Anchors.
  7. Seismic design of piping and restraint of piping, including attachment and/or anchorage to the structure, shall be in accordance with the details shown on the drawings.
- J. Building Piping:
1. Provide chrome escutcheon finish plates where piping passes through walls, floors, or ceilings in finished areas and cabinets.
  2. All major piping penetrations of footings, slabs, floors, walls, and roofs shall be as shown on the Drawings. It shall be the Contractor's responsibility to verify the size and location of all building and structure penetrations prior to pouring concrete or finishing.
  3. Wall pipes and pipe sleeves embedded in concrete walls, floors, and slabs shall be embedded as shown on the Drawings. Support all pipes embedded in concrete walls, floors, and slabs with form work to prevent contact with the reinforcing steel.
  4. Galvanized steel pipe sleeves shall be used on all standard wall penetrations. Waterproof pipe sleeves manufactured by Link-Seal that incorporate waterproof membrane seals shall be used for all piping penetrating exterior walls, roof, and floor slabs on grade.
  5. Galvanized or PVC sleeves shall be used on penetrations of footing walls and grade beams as shown on the Drawings.
  6. Fire-Rated or Smoke-Rated Pipe Penetrations: All piping that penetrates fire-rated or smoke-rated walls, floors, or ceilings shall be fitted with insulated and encased pipe sleeves manufactured by Pipe Shields, Inc., Models DFB, WFB, DFB-CS, WFB-CS, DFB-CS-CW, and WFB-CS-CW.

7. All piping shall be installed parallel to horizontal and vertical building lines except as indicated in the plan drawings. Uniform slope between bottom-of-pipe elevations defined on the plan drawings shall be maintained.

### 3.2 PIPING FABRICATION

#### A. General:

1. The Contractor shall employ only labor that has been qualified by training and experience to capably perform the specified activities required to accomplish the work in a satisfactory manner.
2. If the Contractor has developed alternative techniques or intends to apply alternative methods considered equivalent to those indicated herein, a proposal on such techniques or methods shall be submitted in writing to the Engineer for review at least 14 days before intended date of use.
3. If there is a conflict between the mechanical drawings and piping and instrumentations (P&ID), the P&ID shall take precedence.
4. Any deviations from the Specifications and Drawings require prior review by the Engineer.
5. Unless sloped piping is specifically required for gravity drainage, piping shall be installed level and plumb according to vertical and horizontal planes.

### 3.3 PRESSURE TESTING

#### A. General:

1. The pressure testing requirements defined herein apply to all piping systems.
2. Testing shall be performed by the Contractor on all piping after erection but before any installation of insulation. Furnish all necessary equipment and material and make all taps in the pipe as required. The Owner's Authorized Representative will monitor the tests. Test pressures, media, and durations shall be as specified in Section 15059, Piping Schedule Table. Test all piping with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.
3. Unless otherwise required by the Specifications, shop-fabricated pipe spools are not required to be hydrostatically tested at the shop. Spools shall be field tested after erection. The shop fabricator shall be responsible for the cost of correction of any defects revealed during field hydrostatic tests.
4. The following piping and equipment shall not be subjected to pressure testing:
  - a. Rotating machinery, such as pumps, turbines, and compressors.
  - b. Pressure-relieving devices, such as rupture discs and pressure safety relief valves when the relief pressure is within 10 percent of the test pressure.
  - c. Vessels that do not satisfy impact requirements at the piping test temperature.
  - d. All vessels, regardless of rating, when using gas pressure for testing, except for deionized water services where DI water shall be used.

- e. Locally mounted pressure indicating gauges, where the test pressure would exceed their scale range.
  - f. In-line instrumentation, unless otherwise specified in these Specifications.
5. All pressure systems specified to be tested using water as the test medium shall first be checked by pretesting the test section or system with compressed air at 5 psig for a period of 30 minutes. Correct all leaks disclosed by the pretest before proceeding with the specified testing using water as the testing medium. After producing the specified pretest pressure, disconnect the pressurizing source (do not introduce further pressure for the duration of the test period), repair or replace leaky piping, and retest. Repeat the procedure until the entire system is proven tight.
- B. Testing Buried Piping: Buried piping that is to be pneumatically tested or subjected only to an initial service leak test shall have all joints exposed for the acceptance test.
- C. Test Procedures:
1. Calibration records for gauges used for testing shall be submitted to Engineer.
  2. Two pressure gauges shall be installed for each testing system. Gauges used for testing shall be installed as close as possible to the low point of the piping system.
  3. When starting the filling of lines to be hydrostatically tested, all vents and other connections that can serve as vents shall be open during filling so that all air is vented prior to applying test pressure to a system.
  4. If the maximum operating conditions of piping attached to a vessel are the same as those of the vessel, the piping and the vessel may be tested together. However, if the vessel has different maximum operating conditions, it must be isolated and tested separately.
  5. Examination for leakage shall be made at all joints and connections. The piping system shall show no visual evidence of weeping or leaking. Any visible leakage shall be corrected at the Contractor's sole expense.
  6. If the pressure falls after the pressurizing system is shut off, the source of pressure loss must be determined and corrected. The system must be able to hold the test pressure for the test duration specified in Section 15059, Piping Schedule Table, without any detectable loss.
  7. Piping designed for vapor or gas which is specified to be hydrostatically tested shall be provided with additional temporary supports, if necessary, to support the weight of the test liquid.
  8. If the ambient air temperature is less than 40 degrees F at the time of the pressure testing, the test medium must be heated as required to achieve the following temperatures when filling is complete:
    - a. For pipe wall thickness 1 inch or less, 70 degrees F minimum.
    - b. For pipe wall thickness greater than 1 inch, 100 degrees F minimum.
- D. Special Requirements for Pneumatic Testing - In the context used, "pneumatic" shall mean any gaseous media.

1. The Contractor shall recognize the hazards associated with compressible fluid testing and shall take all necessary precautions to protect all personnel. All piping to be tested shall be secured to prevent damage to adjacent piping and equipment in the event of a joint failure. Any instruments or devices that could be damaged by the test shall be removed from the piping or suitably isolated prior to applying the test. Prior to starting the test, the Contractor shall notify the Engineer.
  2. A preliminary pneumatic test not to exceed 25 psig shall be applied to the piping system prior to final leak testing as a means of locating major leaks. Examination for leakage, detected by soap bubbles, shall be made at all joints and connections. After all visible leaks have been corrected, the pressure in the system shall gradually be increased to not more than one-half of the test pressure, after which the pressure shall be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. The pneumatic test pressure shall be continuously maintained for a minimum duration specified in Section 15059, Piping Schedule Table, and for such additional time as may be necessary to conduct an examination for leakage. The piping system, exclusive of possible localized instances at pump or valve packing, shall show no evidence of leakage. Any visible leakage shall be corrected at the Contractor's sole expense.
- E. Testing Media Requirements:
1. Clean, fresh city water shall be used for hydrostatic testing, except for deionized water services, where DI water shall be used.
  2. Oil-free clean dry air shall be used for pneumatic testing.
  3. Water used for testing austenitic stainless steel materials shall be essentially free from chlorine (not to exceed 100 ppm).
  4. After hydrostatic testing, all water shall be drained immediately. Care shall be taken not to pull a vacuum during draining; open all vents.
- F. Test Repairs:
1. Materials such as gaskets, bolting, etc., damaged during tests and flushing shall be replaced.
  2. New gaskets shall be used each time a flanged joint is made up.
  3. Any welded joint that is defective shall be repaired in accordance with the applicable requirements. Repaired components shall be reexamined by the original method to determine freedom from defects, and all repaired joints shall be retested. Costs for such repair shall be the responsibility of the Contractor.
- G. Test Records - Records shall be made by the Contractor for each piping installation. These records shall include at a minimum the following items:
1. Date of test.
  2. Description and identification of piping tested.
  3. Test fluid.
  4. Test pressure.
  5. Test duration.
  6. Remarks to include such items as:



- a. Leaks (type, location).
- b. Repairs made on leaks.
7. Signature and date of person witnessing the test.
8. Certification by Contractor and reviewed by the Engineer.

### 3.4 TESTING FOR HIGH-PURITY SERVICE

#### A. Level T-1:

1. Helium Leak Test:
  - a. Inboard leak rate, less than  $10^{-9}$  atm-cc per second.
  - b. Outboard leak rate, less than  $10^{-6}$  atm-cc per second.
2. Across-the-Seat Helium Leak Test: Leak rate, less than  $10^{-9}$  atm-cc per second.
3. Particle Generation - Static Testing: Particle generation per operating cycle (open and closed component), zero counts at 0.3 micron and larger particle size.

#### B. Level T-2:

1. Helium Leak Test:
  - a. Inboard leak rate, less than  $10^{-8}$  atm-cc per second.
  - b. Outboard leak rate, less than  $10^{-4}$  atm-cc per second.
2. Across-the-Seat Helium Leak Test: Leak rate, less than  $10^{-7}$  atm-cc per second.
3. Particle Generation - Static Testing: Particle generation per operating cycle (open and closed component), zero counts at 0.3 micron and larger particle size.

### 3.5 CLEANING OF PIPING SYSTEMS

#### A. General Piping Cleaning:

1. After installation and before installing valve or making final connections, flush or purge piping systems clean of foreign substances, using water to flush piping conducting liquid and compressed air to clear piping conducting air or gas. Flushing velocities shall be a minimum of 2.5 feet per second. Cone strainers shall be inserted in the connections to attached equipment and left there until cleaning has been accomplished to the satisfaction of the Owner's Authorized Representative. Lines designated as requiring drying shall be dried immediately after the completion of the flushing. Before forced drying is started, control valves and in-line instruments that may be damaged are to be removed and replaced as necessary with pipe spools. Instrument air (minus 40 degree F dew point) or nitrogen is to be used to purge the piping until a minus 20 degree F dew point is reached. Each low-point drain and the end of each branch line are to be blown until the minus 20 degree F dew point is reached. After each section of piping is dried and approved by the Engineer, the in-line instruments are to be replaced.
2. After installation and testing of systems and before putting into service, remove all strainer screens, clean thoroughly, and reinstall.

- #### B. HVAC Water Piping Cleaning - Requirements: Cutting oil, excess pipe joint compound, weld slag, mill scale, finely divided solids, and other similar foreign materials shall be

removed from all the piping systems before they are placed in operation. The cleaning materials used shall be supplied and applied by this HVAC contractor and all circulation, draining, flushing, and the HVAC contractor shall also do refilling work. Chemical cleaning solutions shall not be harmful to the environment or materials of construction. After the systems have been drained, flushed, and refilled, they shall be left slightly on the alkaline side (pH 7.5). If the systems are on the acid side, the cleaning and testing shall be repeated subject to the approval of the Owner's Authorized Representative. The cleaning of the piping systems shall include the cleaning of all strainers. Tag each strainer after cleaning same. The tag shall contain the date and the name of the person who actually cleaned the strainers.

- C. Chilled, Heating, Glycol, and Secondary Chilled Water Piping Cleaning:
1. Requirements: Cutting oil, excess pipe joint compound, weld slag, mill scale, finely divided solids, and other similar foreign materials shall be removed from all the piping systems before they are placed in operation. The cleaning materials used shall be supplied and applied by this contractor and all circulation, draining flushing, and this contractor shall also do refilling work. Chemical cleaning solutions shall not be harmful to the environment or materials of construction. After the systems have been drained, flushed, and refilled, they shall be left slightly on the alkaline side (pH 7.5). If the systems are on the acid side, the chemical testing shall be repeated subject to the approval of the Engineer. The cleaning of the piping systems shall include the cleaning of all strainers. Tag each strainer after cleaning same. The tag shall contain the date and the name of the man who actually cleaned the strainer.
  2. Cleaning Procedures - After all equipment and piping have been installed complete, the piping systems shall be cleaned as follows:
    - a. A solution of 1/4 pound sodium hydroxide plus 1 pound of trisodium phosphate per 50 gallons of water in the system circulated for 24 hours, at a minimum temperature for each system. Each standby pump shall operate 50 percent of the time, all other pumps 100 percent of the time. Operate pumps 2 hours on and 2 hours off to allow chemicals time to soak.
    - b. System drained and thoroughly flushed with water.
    - c. Systems shall be filled, operated, and drained repeatedly as described in Item 1 above until clean and free from dirt. Strainers at pumps and control valves and wherever else they occur in a system shall have mesh elements removed and cleaned or replaced repeatedly until system can operate continuously with no buildup of dirt on strainer mesh elements.
    - d. Provide a notice, in writing, 10 days prior to the cleaning of the system.
- D. Special Clean-for-Oxygen Service Piping Systems:
1. Following assembly and testing piping designated as "clean-for-oxygen service" shall be cleaned and passivated to remove loose scale, slag, weld spatter, oxidation, and other foreign mater by the following method:
    - a. Fill piping with hot DI water (resistivity of at least 18 megohm-cm prior to heating).

- b. Recirculate at 160 degrees F for 30 minutes.
  - c. Rinse and drain from each outlet.
  - d. Use an acid cleaner (0.5 to 1 percent phosphoric or nitric acid).
  - e. Recirculate for 10 minutes at 150 degrees to 180 degrees F.
  - f. Rinse and drain adequately from each outlet.
  - g. Check pH of rinse water to ensure complete rinsing. Continue to rinse until all residual electrolyte has been removed.
2. Upon completion of passivation procedure, all lines shall be completely drained, dried using particle-free and moisture free nitrogen, and closed.
- E. Chemical Treatment: Notify Owner's Authorized Representative 10 days prior to the time water treating chemicals will be required of introduction in the system by Contractor. Owner's Authorized Representative shall witness application of all chemicals and Contractor shall verify that all initial concentrations have been reached as specified prior to startup before system will be accepted. Actual readings of all treatment levels shall be documented and reported to the Owner's Authorized Representative in writing. Contractor shall coordinate addition of all chemicals to all system requiring treatment to permit Owner's Authorized Representative to be present.

### 3.6 ACCEPTANCE

- A. The Owner's Authorized Representative reserves the right to have any section of the piping system which is suspected to be faulty cut out of the system by the Contractor for inspection and testing. Should the joint prove to be sound, the Owner will reimburse the Contractor on a time-and-material basis as specified in the Contract. Should the joint prove to be faulty, the destructive test will continue joint by joint until sound joints are found. Costs for replacement of faulty work and/or materials shall be the responsibility of the Contractor.

### 3.7 TABLE 1: LINE CLASS DESIGNATIONS

First Letter		Second Letter		Third Letter	
Symbol	Pipe Material	Symbol	(psig)	Rated	
				Symbol	Joint or Service
A	A-53B black, steel	A	ATM	A	Welded
B	A-53B galvanized	B	50	B	Threaded
C	A-53B galvanized	C	100	C	Soldered
D	A-106B Schedule 40/A-53B, steel	D	125	D	Brazed
E	A-106B Schedule 80/A-53B, steel	E	150	E	Compression
F	A-106/A-53B all Schedule 80, steel	F	300	F	Hub
H	A-199, 1 1/4 Cr, 1/2 Mo, steel	H	900	H	Solvent cement

First Letter		Second Letter		Third Letter	
Symbol	Pipe Material	Symbol	(psig)	Rated	
				Symbol	Joint or Service
I	Copper			I	Seal weld
J	304L, stainless	I	15	J	Jacketed
K	316L, stainless	J	175	K	No copper
L	FRP			L	Blowdown
M	Polyethylene			M	Flanged
N	Polypropylene			N	Oxygen
O	PVC, Schedule 40			O	FM approved
P	PVC, Schedule 80			P	Grooved end
Q	CPVC			Q	50 percent caustic
R	PVDF			R	Chlorine
S	TFE lined			S	Hydrogen
T	FEP lined			T	Electronics
U	PVDF lined			U	Fuel gas
V	Ductile iron			V	No hub
W	Cryogenic			W	Fusion welded
X	Polypropylene lined			X	Chemicals
Y	Nickel 200			Y	Shrinkable sleeve
Z	A-106B Schedule 80			AA	Coaxial
1	Polybutylene				
2	ABS				
3	Cast iron				
4	Carbon steel tubing				
5	Clay				
6	Rubber hose				
7	Concrete				
8	304				
9	Teflon				
10	Hastelloy C-22				

END OF SECTION



## Section 15080 Copper Tubing Systems

### PART 1 -- GENERAL

#### 1.1 WORK INCLUDED

- A. This Section specifies the requirements for materials, fabrication and installation of copper piping systems.

#### 1.2 RELATED WORK

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for copper piping systems (excluding high purity copper piping).
  - 1. Section 15060 - Pipe and Pipe Fittings, General.
  - 2. The individual pipe class specification sheets included at the end of this Section.
- B. CAUTION: Use of this Section without including all of the above-listed items will result in omission of basic requirements.
- C. In the event of conflict regarding copper tubing system (excluding high purity) requirements between this Section and any other section, the provisions of this Section shall govern.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Copper and copper alloy pipe, tubing, and fittings shall be stored, separated by types, in an indoor storage area provided by the Contractor.

### PART 2 -- PRODUCTS

#### 2.1 GENERAL

- A. Material requirements concerning the tubing, fittings, flanges, unions, solder, thread dope and gaskets are specified in the Pipe Class Specification Sheets provided at the end of this Section.

PART 3 -- EXECUTION

## 3.1 TOOLS

- A. Flat-faced wrenches and vises are to be used for copper systems. Pipe wrenches and vises with toothed jaws will damage copper materials and shall not be used.

## 3.2 TUBING PREPARATION

- A. Cut tubing square and remove burrs. Clean both inside of fittings and outside of tubing with steel wool and muriatic acid before sweating. Take care to prevent annealing of fittings and hard-drawn tubing when making connections.

## 3.3 BRAZING QUALIFICATION

- A. The qualification of brazing procedures, brazers, and brazing operators shall be in accordance with the requirements of Section IX of the ASME Code.

## 3.4 VALVE INSTALLATION

- A. Prior to brazing of valves, Teflon and elastomer seats and seals shall be removed to prevent damage.

## 3.5 INSTALLATION OF INSTRUMENT AIR TUBING

- A. All instrument air supply lines shall be minimum 3/8 inch nominal unless otherwise shown. All instrument air control lines shall be 1/4 inch nominal.
- B. Care shall be taken to keep tubing and conduit runs away from hot pipes, and under no circumstances shall they be less than 12 inches from any such pipe.
- C. Bends in soft temper tubing shall be long sweep, wherever possible. Bends shall be shaped with bending tools and shall be made without appreciable flattening, buckling, or thinning of the tube wall at any point.
- D. Individual pipe, tubing runs, and instrument capillary tubing shall be continuously supported in channels, trays, conduits, or from structures so that mechanical damage will not occur, and shall be clamped in place. Tubing trays and channels shall be located in such a manner that they will not catch spillage, overflow, or dirt from above.



## 3.6 PIPE CLASS SPECIFICATION SHEET

A. Pipe class	IDC
Services	CD Condensate Drain
Rating	Pressure 125 psig at 180 degrees F
Codes	ANSI B31.3
Pipe	Above ground Copper, smls, Type L, hard drawn, B-88 Below ground Copper, smls, Type K, hard drawn, B-88
Fittings	Wrought copper, ANSI B16.22 socket joint, B-75
Flanges	Copper, socket joint, Class 125 FF
Unions	Copper, socket joint, Bronze ring nut
Solder	2 inches and under, 95-5 tin antimony; 2-1/2 inches and larger, brazed
Bolting	Machine bolts, A-307 Gr B, with heavy hex nuts, plated
Thread Dope	1 inch and under: Teflon tape; over 1 inch: Rectorseal T plus 2
Gaskets	Full face, 1/8 inch thick, EPDM rubber, Class 125

END OF SECTION



## Section 15140

### Piping Supports and Anchors

#### PART 1 -- GENERAL

##### 1.1 WORK INCLUDED

- A. This Section specifies the requirements to furnish and install pipe hangers, supports and associated anchors.
- B. Items Included:
  - 1. Related specifications.
  - 2. Submittals.
  - 3. Definitions.
  - 4. Acceptable manufacturers and types.
  - 5. Installation.
  - 6. Support spacing and locations.

##### 1.2 RELATED WORK

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for piping supports and anchors:
  - 1. Section 01061 – Design/Build Requirements
  - 2. Section 01340 – Shop Drawings, Product Data, Samples
  - 3. See Structural Drawings for miscellaneous steel, slotted channel, and concrete requirements.
  - 4. Section 15050 – Basic Mechanical Requirements
  - 5. Section 15059 – Piping Schedule
  - 6. Section 15060 -- Pipe and Pipe Fittings; General.
- B. CAUTION: Use of this Section without including all of the above-listed items will result in omission of basic requirements.
- C. In the event of conflict regarding piping support and anchor requirements between this Section and any other section, the provisions of this Section shall govern.

##### 1.3 DESIGN REQUIREMENTS

- A. When supports, anchors, and seismic restraints for equipment and supports and seismic restraints for, piping and ductwork are not shown on the Drawings, the Contractor shall be responsible for their design.
- B. Contractor engineered support/bracing systems shall be designed and detailed, and the submittal shall bear the seal of a professional engineer registered in Oregon.

- C. Strength:
  - 1. Support systems shall be appropriate for the weight of equipment, piping and ductwork.
  - 2. Systems shall be seismically braced and/or anchored in accordance with the Uniform Building Code.
  - 3. The building structure and attachments to the structure shall be sufficiently strong to resist the weights and seismic forces.
  - 4. Conform to site standards.
  - 5. Consider thermal expansion and contraction when placing seismic restraints so that no thermal over-stresses occur.
  - 6. The piping supports, anchors, and braces shall be in accordance with the requirements of the following:
    - a. ANSI B31.1 - Power Piping Code.
    - b. ANSI B31.3 – Process Piping Code.
    - c. MSS SP-58, SP-69, SP-89 - Pipe Hangers and Supports.
    - d. SMACNA's Seismic Restraint Guidelines for Mechanical Systems.
- D. Movement:
  - 1. Provide flexibility in piping and ductwork at building seismic joints to accommodate Uniform Building Code required movements.
- E. Fire Rating:
  - 1. Penetrations through fire rated walls and floors shall have UL approved assemblies that match the rating of the wall or floor.

#### 1.4 SUBMITTALS

- A. Section 01340 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate system layout with location and detail of trapezes, hangers, and braces.
- C. Product Data:
  - 1. Hangers, Supports and Braces: Submit manufacturers catalog data including load capacity.
  - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- D. Structural Calculations
- E. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- F. Design Data: Indicate load carrying capacity of trapeze hangers, braces, and hardware.

- G. Manufacturer's Installation Instructions:
  - 1. Hangers and Supports: Submit special procedures and assembly of components.
  - 2. Firestopping: Submit preparation and installation instructions.

#### 1.5 DEFINITIONS (SPECIFIC TO THIS SECTION)

- A. Hot Pipes: Pipe systems with operating temperature greater than 100 degrees F.
- B. Cold Pipes: Pipe systems with operating temperature less than or equal to 100 degrees F.

### PART 2 -- PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Pipe Hangers and Supports:
  - 1. Grinnell.
  - 2. Pipe Shields.
  - 3. B Line.
  - 4. Unistrut.
  - 5. Fronex Company.
  - 6. Piping Technology and Products.
  - 7. Bergen-Paterson.
- B. Pipe Hanger Isolation Shields:
  - 1. Pipe Shields Incorporated.
  - 2. Insul-Shield.
  - 3. Rilco.
  - 4. Bergen - Paterson.
- C. Metal Framing Systems: Refer to Structural Drawings.
- D. Concrete Anchors: Refer to Structural Drawings.
- E. Alignment Guides:
  - 1. Grinnell.
  - 2. Pipe Shields Inc.
  - 3. Rilco.
  - 4. Bergen - Paterson.

#### 2.2 GENERAL

- A. All hangers, rods, clamps, protective shields, metal framing support components, and hanger accessories shall be electrogalvanized or cadmium plated unless primed and painted.

- B. Provide oversized hangers for all insulated piping to accommodate insulation thickness specified.
- C. The load limits for manufacturers hanger components shall not be exceeded.
- D. Do not support piping with wire either temporarily or permanently.
- E. Do not support piping over 8 inches in diameter with slotted channels such as Unistrut P1000.
- F. The maximum deflection of a channel member supporting at midpoint of span shall not be greater than 1/8 inch.
- G. Piping shall be installed plumb to vertical and horizontal planes.

### 2.3 PIPE HANGERS AND SUPPORTS

- A. Pipe hanger and support components are listed below. Where more appropriate items are required to accommodate the pipe loading, displacements, or other conditions, submit these items to the Engineer.
- B. Individual Hangers for Cold Pipe up to 30-Inch Pipe Size: carbon steel, adjustable, clevis type, Grinnell Figure 260 black; stainless steel pipe use stainless steel materials.
- C. Individual Hangers for Hot Pipe: insulated 2-bolt hanger; pipe shields, Model D1000 through D6300.
- D. Trapeze Hanger Type Supports: Construction of field fabricated back to back channels shall be compatible with Grinnell channel assembly Figure 45.
- E. Vertical Support- Uninsulated Piping: steel riser clamps. Grinnell Figure 261 with steel members, and Figure 40 with rods. Minimum of two shear lugs sized to accommodate the applicable load welded to pipe 180 degrees apart are required for riser clamps. The lug material shall be compatible with pipe materials.
- F. Floor Support for Pipe Systems to 4 Inches and All Cold Pipe Sizes: cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support; Grinnell Figure 264, black only.
- G. Floor Support for Hot Pipe Sizes 6 Inches and Over: adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- H. Copper Pipe Support: carbon steel ring, adjustable, copper plated; Grinnell Figure CT-99, CT-65, or plastic-coated Grinnell Figure CT-99C.

- I. Shields at Insulated Piping: Top and bottom galvanized steel shields over insulation in two 180 degree segments, tightened with nylon cable ties at each end. Length and gauge of steel shall be per Grinnell fig. 167.
- J. Rigid Insulation for Hot Pipe Supports and Braces: Top and bottom 200 psi compressive strength hydrous calcium silicate insulation for iron pipe. 80 psi compressive strength polyurethane modified polyisocyanurate cellular plastic insulation for copper pipe. Thermo-12 Gold by Schuller for iron pipe and Trymer 4000 by Dow Plastics for copper pipe. Length of insulation shall be at least 3 inches longer than the galvanized shields.
- K. Rigid Insulation for Cold Pipe Supports and Braces: Top and bottom 12 inch long 80 psi compressive strength polyurethane modified polyisocyanurate cellular plastic insulation. Trymer 4000 by Dow Plastics. Length of insulation shall be at least 3 inches longer than the galvanized shields.
- L. Nonmetallic Piping Supports: Special protection shields and neoprene pads shall be provided as recommended by the pipe manufacturer.
- M. Sliding Type Supports: PTFE slide plates consisting of carbon steel tees, plates and PTFE sliding surfaces for free movement of piping due to expansion and contraction; Grinnell Figure 247, Pipe Shields Model B1000 through B2300 for insulated piping.
- N. Slotted Channel Framing: Refer to Structural Drawings.
- O. Steel Hanger Rods: Threaded both ends or continuous threaded. Grinnell Figure 140 or 146 black. Electro galvanized rods for corrosion resistant areas or areas exposed to moisture.
- P. Anchors: Pipe Shields Model C4000 through C4300 for insulated Ferrous piping.

#### 2.4 CONCRETE ANCHORS

- A. Refer to Structural Drawings.
- B. Use of expansion nail type anchors, drop-in anchors, power driven fasteners and friction spring-type clips are prohibited.

#### 2.5 FABRICATION

- A. Fabricate piping and equipment supports in accordance with the requirements of paragraph 1.3 of this Specification.
- B. Design hangers without disengagement of supported pipe.

- C. Provide copper-plated hangers and supports for copper piping. Where copper plating is not available on support components, provide sheet neoprene or other approved insulating material.

## 2.6 FINISH

- A. Prime coat exposed black steel hangers and supports. Hangers and supports located in crawlspaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- B. Galvanized materials are not acceptable in cleanroom areas.

## PART 3 -- EXECUTION

### 3.1 GENERAL

- A. No attempt has been made to show all required pipe supports in all locations, either on the Drawings or in the Details. The absence of pipe supports and details on any Drawing shall not relieve the Contractor of the responsibility for furnishing and installing them as required.
- B. Pipe support system components shall withstand dead loads imposed by the weight of the pipes filled with water and shall have a minimum safety factor of five.
- C. All piping shall be supported in a manner, which will prevent undue stress on any valve, fitting, or piece of equipment. In addition, pipe supports shall be provided at changes in direction or elevation, adjacent to flexible couplings, and where otherwise shown. Pipe supports and hangers shall not be installed in equipment access areas.
- D. Where horizontal piping is arranged with two or more parallel lines, trapeze hangers may be used in lieu of individual hangers. Trapeze assembly shall consist of structure attachments as previously specified with rod size dependent upon the total weight supported, spacing of assemblies determined by the minimum pipe size included in the group supported. Trapeze horizontal shall be a standard structural shape of sufficient size to prevent measurable sag between rods, all lines attached to the horizontal with intermediate pipe guides and U-bolts or one-hole clamps. Pre-engineered support equipment may be used when selected and installed in accordance with the manufacturer's recommendations. Trapeze design shall be reviewed by the Engineer.
- E. No copper pipe shall contact a pipe support or hanger of dissimilar metal. Hangers and supports for copper pipe shall be copper-plated, plastic coated, or copper pipe shall be isolated with insulating Neoprene strips, or as approved.
- F. No piping shall be supported from the pipe above.
- G. Oversized pipe hangers shall be used on all insulated piping to allow insulation to run continuous through the hanger, or to allow clearance for pipe shields. Metallic pipes



shall have no contact with hangers, clamps, brackets, or any other pipe support mechanism where sound and vibration control is required on pumped systems.

- H. Horizontal piping hanger support rods shall attach to steel beams with center-loading I-clamps or welded beam attachment, and to concrete with concrete anchors, to wood not less than 2 1/2 inches thick with lag screws and angle clips. Welding shall be in accordance with AWS Section D1. Concrete anchors shall not cut existing reinforcing steel.
- I. Provide sufficient pipe support spacing to allow for a 25 percent expansion.
- J. Stiff leg support is not approved for vibration isolated piping.
- K. Provide material isolation at pipe clamp supports on PVC pipe.
- L. Provide pre-insulated pipe support devices on isolated piping at hanger locations.

### 3.2 PIPE HANGERS AND SUPPORTS

- A. Support individual horizontal piping as follows:

#### Pipe Hanger Requirements For Dead Load Supports

Pipe Size	Steel Pipe Maximum Hanger Spacing Water Service	Steel Pipe Maximum Hanger Spacing Stm. Gas or Air Service	Copper Pipe Maximum Hanger Spacing	Rod Hanger Diameter
1/2 thru 3/4 inch	7'	8'	5'	3/8"
1 thru 1-1/4 inches	7'	9'	6'	3/8"
1-1/2 inches	9'	12'	8'	3/8"
2 inches	10'	13'	8"	3/8"
2-1/2 inches	11'	14'	10'	1/2"
3 inches	12'	15'	10'	1/2"
4 inches	14'	17'	10'	5/8"
5 inches	16'	19'	10'	5/8"
6 inches	17'	21'	10'	3/4"
8 inches	19'	24'	10'	7/8"
10 inches	22'	26'		7/8"
12 inches	23'	30'		7/8"
14 inches	25'	32'		1"
16 inches	27'	35'		1"
18 inches	28'	37'		1-1/4"
20 inches	30'	39'		1-1/4"

Pipe Size	Steel Pipe Maximum Hanger Spacing Water Service	Steel Pipe Maximum Hanger Spacing Stm. Gas or Air Service	Copper Pipe Maximum Hanger Spacing	Rod Hanger Diameter
24 inches	32'	42'		1-1/2"
26 inches	32'			1-1/2"
30 inches	33'			1-3/4"
36 inches	34'			2"
42 thru 60 inches	36			2-1/2"

## Notes:

1. Use these maximum hanger spacings unless stated otherwise on the Drawings.
2. Rod hanger diameter is based upon maximum support span of water filled pipe. For shorter spans refer to hanger manufacturer's published load ratings.
3. Rods may be reduced one size for double rod hangers supporting a single pipe. Minimum rod diameter shall be 3/8 inch.
4. Hanger spacing for horizontal piping at a change of direction shall be reduced to 3/4 of the spacing specified above.
  - B. Size hanger rod for copper pipe the same as for steel pipe.
  - C. Size hanger rod for plastic pipe the same as for steel pipe. Space hangers as specified in the applicable piping specification or as shown on the piping drawings
  - D. Install hangers to provide a minimum 1/2-inch space between the face of the support and the finished covering of the adjacent work with consideration for thermal movement.
  - E. Place a hanger within 12 inches of each horizontal elbow and on both sides of valves weighing 20 pounds or more unless written justification is provided to do otherwise.
  - F. Use hangers with 1-1/2 inches minimum vertical adjustment.
  - G. Support horizontal cast iron pipe adjacent to each hub with 5 feet maximum spacing between hangers.
  - H. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub. Piping thermal expansion and contraction must be considered to select proper supporting components.
  - I. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - J. Support riser piping independently of connected horizontal piping.

K. Do not support hot and cold piping on a common trapeze unless thermal effects are considered.

L. Support tubing at the following intervals.

TUBE SIZE (inches)	MAXIMUM SPACING (feet)	MINIMUM ROD DIAMETER (inches)
up through 5/8	6	3/8
7/8 through 1-1/8	8	3/8
1-3/8 through 2-1/8	10	3/8
2-5/8 through 5-1/8	10	1/2
6-1/8	12	5/8
8-1/8	12	3/4

M. Support individual horizontal steel piping as follows:

END OF SECTION



## Section 15290 Ductwork Insulation

### PART 1 -- GENERAL

#### 1.1 WORK INCLUDED

- A. This Section specifies the requirements necessary to furnish and install ductwork thermal insulation and internal sound attenuation insulation.

#### 1.2 RELATED WORK

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for ductwork insulation.
  - 1. Section 15050 - Basic Mechanical Requirements.
- B. CAUTION: Use of this Section without including all of the above-listed items will result in omission of basic requirements.
- C. In the event of conflict regarding ductwork insulation requirements between this Section and any other section, the provisions of this Section will govern.

#### 1.3 QUALITY ASSURANCE

- A. Provide insulation with composite (insulation-jacket-adhesive) fire and smoke hazard ratings not exceeding a flame spread of 25 and smoke developed of 50, as tested by Procedure ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials, NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials, and UL 723 Standard for Safety Test for Surface Burning Characteristics of Building Materials.
- B. Provide interior duct lining materials meeting the life safety standards as established by NFPA 90A Standard for the Installation of Air Conditioning and Ventilation Systems.
- C. Installer Qualifications: firm with a minimum of 3 years experience in ductwork insulation application.
- D. Manufacturer's Qualifications: firm with a minimum of 10 years experience in ductwork insulation manufacturing.

#### 1.4 SUBMITTALS

- A. Provide the following within 3 weeks of award of Contract:
  - 1. Product data sheets for all insulation, liners, and adhesives.

2. Manufacturer's instructions for installation.

## PART 2 -- MATERIALS

### 2.1 INTERNAL DUCT LINER

- A. Flexible Glass Fiber Insulation (Type D):
  1. Flexible duct liner insulation, thickness as scheduled, 1.5-pcf density, with fire-resistant fiberglass mat coating on the air side rated for 6,000-fpm air velocity.
  2. Thermal conductivity no greater than 0.24 Btu-inch per hour-ft<sup>2</sup> degrees F at 75 degrees F.
  3. Acceptable Manufacturers:
    - a. CertainTeed Corp: ToughGard Duct Liner, Type 300.
    - b. Johns Manville: Permacote Linacoustic.
    - c. Knauf Fiber Glass: Knauf Duct Liner E-M.
  4. Acoustical Performance:
    - a. Determine acoustical performance with a Type F25 mounting in accordance with ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
    - b. Minimum acoustical performance shall be as follows:

Sound Absorption Coefficient at Frequency

Insulation Type	Thickness (Inches)	125	250	500	1,000	2,000	4,000	NRC
D	1	0.05	0.25	0.57	0.78	0.87	0.89	0.60

### 2.2 ACCESSORIES

- A. Adhesives: water based; Miracle PF 102.
- B. Lagging Adhesive: fire resistive.
- C. Welded Fasteners: galvanized steel pin and washer fastener.
- D. Tie Wires: galvanized, 20 gauge.
- E. Joint Tape: foil scrim kraft (KSF) tape.
- F. Impale Anchors: galvanized steel, 13-gauge nail, self-adhesive pad, 30-gauge galvanized steel washers.

PART 3 -- INSTALLATION

## 3.1 FIELD PREPARATION

- A. Install external insulation materials after ductwork has been cleaned, sealed, and has passed pressurization tests.
- B. Clean surfaces to encourage adherence of adhesives.

## 3.2 INSTALLATION

- A. General: Install materials in accordance with the manufacturer's instructions.
- B. Internal Duct Insulation (Type D):
  - 1. General: Apply liner in accordance with the SMACNA Duct Liner Application Standard
  - 2. Application: Apply internal insulation to flat sheet metal with continuous coverage of adhesive. Use adhesive on all butt edges. Install clip-pins at 15 inches on center and no more than 2 inches maximum from any cut or exposed edge. Select pin length based on the liner manufacturer's recommendations. Use of mail-type fasteners is prohibited.
  - 3. Dimensions: Duct dimensions shown are net inside dimension. Increase the size of sheet metal to allow for liner thickness.
  - 4. Plenums: Provide 1-inch mesh hardware cloth facing over attenuated plenum floors.
  - 5. Nosing Strips: Provide nosing strips at each joint in the duct liner where air velocities exceed 1,500 fpm, at cut edges in lined plenums, at leading edges on air intakes, and where noted or otherwise specified.

## DUCTWORK INSULATION SCHEDULE

Location	Insulation Type	Insulation Thickness (Inches)	Notes
Supply air ductwork	D	1	1, 2
Return air ductwork	D	1	1

## Notes:

1. Where shown or otherwise specified.
2. Duct exposed in indoor spaces it serves does not require thermal insulation.

END OF SECTION



## Section 15731

# Packaged Rooftop Heat Pump Units

### PART 1 -- GENERAL

#### 1.1 WORK INCLUDED

- A. This Section specifies the requirements necessary for packaged rooftop air-conditioning units for outdoor installation.

#### 1.2 RELATED WORK

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for ductwork insulation.
  - 1. Section 15050 - Basic Mechanical Requirements.
- B. CAUTION: Use of this Section without including all of the above-listed items will result in omission of basic requirements.
- C. In the event of conflict regarding packaged rooftop cooling unit requirements between this Section and any other section, the provisions of this Section will govern.

#### 1.3 QUALITY ASSURANCE

- A. Rating Standards:
  - 1. ARI Standard 210/240 Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
  - 2. ARI Standard 270 Sound Rating of Outdoor Unitary Equipment.
- B. Design Standard: ANSI B9.1
- C. Roof Curb: Comply with NRCA standards.

#### 1.4 REGULATORY REQUIREMENTS

- A. Energy Efficiency: Comply with Oregon Energy Code for the minimum energy efficiency requirements of air conditioning and ventilation systems.
- B. Insulation and Adhesives: Comply with NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems.

## 1.5 WARRANTY

- A. Provide manufacturer's 1-year standard parts warranty and 5-year compressor warranty in writing with Owner named as beneficiary. Warranty shall provide for correction or, at the option of the Owner, removal and replacement of the refrigeration compressors found defective during stated warranty period after the Date of Substantial Completion.

## 1.6 SUBMITTALS

- A. Provide the following within 3 weeks of execution of the Contract:
1. Shop drawing showing details of construction, dimensions, arrangement of components, filters, isolation, wiring diagrams, etc.
  2. Product data showing performance data, standard items and accessories, and operating weight.
  3. Electrical interface, voltage, and loading.

## PART 2 -- MATERIALS

### 2.1 PACKAGED ROOFTOP AIR CONDITIONING UNITS (3 TO 10 TONS)

- A. Acceptable Manufacturers:
1. Trane
  2. Carrier
  3. McQuay
  4. York
- B. Unit Description: Factory-Assembled, Single-Packaged, Heat Pump Rooftop Unit, Including the Following:
1. Unit casing.
  2. Evaporator refrigerant coil.
  3. Supply fan, motor and drive assembly.
  4. Condenser refrigerant coil.
  5. Condenser fan and motor.
  6. Refrigerant compressors.
  7. Air filters.
  8. Outdoor and return air dampers.
  9. Refrigerant piping.
  10. Refrigerant and specialties.
  11. Complete wiring and controls.
  12. Roof curb.
  13. Full economizer section with powered relief fan.
- C. Casing:

1. Exterior: weatherproof galvanized steel, bonded and coated with manufacturer's standard back enamel or air-dry finish. Unit's surface shall be tested 1,000 hours in a salt spray test in compliance with ASTM B117.
  2. Exterior Top: one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed.
  3. Interior: Insulate with ½-inch, 1-pound density foil-faced, closed cell material. All insulation edges shall be either captured or sealed.
  4. Access Panels: removable with lifting handles, and sealed water and air tight.
  5. Lifting Provisions: base rails provided with forklift pockets and suitable for overhead rigging.
  6. Supply and Return Duct Connections: horizontal or vertical, as indicated on the Drawings.
  7. Coil Section Drain Pan: insulated galvanized steel, double-sloped with drain connections that provide complete drainage of coil condensate.
- D. Supply Fan, Motor, and Drive Assembly:
1. Fan Wheel: double inlet, forward curved steel with corrosion-resistant finish, dynamically balanced.
  2. Motor: TEFC with permanently lubricated bearings, and automatic reset thermal overload protection. Motors shall meet U.S. Energy Policy Act of 1992 (EPACT).
  3. Drive Assembly: direct or belt drive as indicated on the Drawings. Belt drive assemblies shall have a variable pitch motor drive pulley with drive rated for 1.5 times the motor horsepower.
- E. Condenser Fan and Motor:
1. Fan: propeller type, upflow discharge, dynamically balanced, direct drive with fan guard.
  2. Motor: TEFC with permanently lubricated bearings and automatic thermal overload.
- F. Evaporator and Condenser Refrigerant Coils:
1. Tuber: seamless copper, brazed joints.
  2. Fins: aluminum, mechanically bonded to copper tubes.
  3. Circuiting: active full-face design.
  4. Coil Guard: welded wire, all coil faces.
  5. Factory Pressure Test: 450-psig and 200-psig underwater leak test.
- G. Compressor:
1. Type: fully hermetic, reciprocating or scroll with internal suction and discharge valves, positive oil lubrication, crank-case heater, and low pressure switches.
  2. Motor: suction gas cooled with internal over-temperature and over-current protection.
  3. Vibration Isolation: manufacturer's standard spring or rubber type vibration isolators.

- H. Refrigerant Specialties:
1. Expansion Valve: fixed orifice or thermal expansion type.
  2. Piping: complete system with Type ACR copper and silver brazed joints with isolation between pipe and pipe clamps.
  3. Site Glass: provide on liquid line.
  4. Filter Dryer: provide on liquid line
  5. Valves: provide on liquid and suction lines with Shraeder-type valves for refrigerant management.
- I. Controls:
1. General: microprocessor controls using direct digital control technology.
  2. Refrigeration: high- and low-pressure switches, factory set and field calibrated anti-recycle timer control for compressor.
  3. Space Temperature: wall-mounted, 7-day programmable type with occupied/unoccupied set points, on-off-auto fan switch, off-heat-auto-cool heating changeover switch, and occupancy override switch on the cover face.
  4. Economizer Control: fixed dry bulb based control of outside and return air dampers.
  5. Phase Monitor: provide protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor with an LED to indicate an ON or FAULT. Module will automatically reset from a fault condition.
- J. Roof Curb:
1. Construction: formed galvanized steel, wood nailer strip, suitable for support of entire unit weight per NRCA standards.
- K. Filters:
1. Frame Assembly: galvanized steel or aluminum supports suitable for 2-inch thick filters, 350-fpm maximum face velocity.
  2. Filters: 2-inch thick, disposable, panel type rated 30 percent efficient per ASHRAE Standard 52.
- L. Economizer Section:
1. General: integrated incremental modulating type capable of simultaneous economizer and compressor operation suitable for up to 100 percent outdoor air.
  2. Damper Blades: galvanized steel or aluminum, low-leakage type, interlocked for gang operation.
  3. Seals: neoprene or metal type for blade edges and end seals.
  4. Bearings: nylon, Teflon, or oil-impregnated bronze.
  5. Shafts: steel.
  6. Actuator: electric with spring return to close outside air on shutdown or power failure.
  7. Air Relief Damper: motorized, interconnected with power exhaust fan.

- M. Electrical Requirements:
  - 1. Connection: provide single point for system components with fused disconnect switch rated at 50 kA rms symmetrical.
  - 2. Motor Control: provide combination motor starters suitable for motor size supplied.
  - 3. Power Supply: as indicated on the Drawings.
  - 4. Approval: UL listed with wiring per NEC requirements.
- N. Performance: as indicated on the Drawings.
- O. Accessories:
  - 1. CO2 Sensing: duct mounted, user-adjustable set point to modulate outside air damper and maintain the CO2 concentration to a minimum level.
  - 2. Smoke Detector: Unit mounted return air smoke detector, factory wired to shut down unit upon smoke detection and auxiliary contacts for connecting to building fire alarm system.
  - 3. Back-up Electric Heaters: electric heater elements constructed of heavy-duty nickel chromium elements internally delta connected for 240 volt, wye connected for 480 and 600 volt. Staging as indicated on the drawings. Each heater shall have automatically reset high limit control and be individually fused in accordance with NEC and CEC requirements. Power assemblies shall be single point connection. Electric heat modules shall be UL listed or CSA certified.

### PART 3 -- INSTALLATION

#### 3.1 INSPECTION

- A. Verify that the preparation work required before execution of work specified in this Section has been completed and is acceptable.
- B. Notify the Engineer and Owner's Authorized Representative in writing describing conditions that are not acceptable for execution of work specified in this Section. Recommend remedial work as necessary. Do not proceed with work of this Section until unacceptable conditions are corrected.

#### 3.2 INSTALLATION

- A. Install units in accordance with manufacturer's written instructions.
- B. Install roof curb level and apply 2-inch thick, 2-pcf-density rigid duct insulation inside curb, on all surfaces, prior to unit placement.
- C. Provide minimum 3-inch trap seal on condensate drain connections and field route to nearest rain drain or downspout.
- D. Install air filters before operating units.

### 3.3 FIELD QUALITY CONTROL

- A. Functional Tests: Conduct on each packaged rooftop air conditioning unit, assisted by the manufacturer's representative.
- B. Performance Tests:
  - 1. Conduct on each packaged rooftop air conditioning unit, assisted by the manufacturer's representative.
  - 2. Perform under actual or approved simulated operating conditions.

END OF SECTION

## Section 15811

# HVAC Ductwork and Accessories

### PART 1 -- GENERAL

#### 1.1 WORK INCLUDED

- A. This Section specifies the work necessary to furnish and install, complete, metal HVAC ductwork systems with pressure classifications ranging from negative 3 inches WC to positive 10 inches WC.
- B. The SMACNA publication HVAC Duct Construction Standard--Metal and Flexible generally governs the material gauges and the fabrication and installation techniques for systems specified in this Section of work. SMACNA criteria are superseded by the requirements of this Section.

#### 1.2 RELATED WORK

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for the referenced metal HVAC ductwork and accessories.
  - 1. Section 15050 - Basic Mechanical Requirements.

#### 1.3 DESIGN STANDARDS

- A. SMACNA Publications:
  - 1. HVAC Duct Construction Standards - Metal and Flexible.
  - 2. Seismic Restraint Manual, Guidelines for Mechanical Systems.
  - 3. Fire Damper and Heat Stop Guide for Air-Handling Systems.
- B. NFPA Publications:
  - 1. 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
  - 2. 91 - Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying.
  - 3. 96 - Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.

#### 1.4 SYSTEM DESCRIPTIONS

- A. Definitions:
  - 1. Duct: a tube or channel, including fittings, through which a gas moves.
  - 2. Ductwork: a system of interconnected ducts and duct accessories including, but not limited to, isolation and balancing dampers, smoke and/or fire dampers, access doors, turning vanes, flexible connections, air extractors, hangers and supports,

and all other miscellaneous items required for a completely operable and adjustable system.

B. Description:

1. Primary Air Distribution Ductwork: ductwork and duct accessories from the discharge of air-handling units to their respective terminal unit primary air inlets.
2. Terminal Unit Distribution Ductwork: ductwork and duct accessories from the discharge of terminal units to their respective terminations, outlets, and free discharge openings.
3. Terminal Unit Return Ductwork: ductwork and duct accessories on the inlet to fan-powered terminal units (not ductwork connected to the primary air inlet).
4. Supply Air Ductwork: ductwork and duct accessories from the discharge of fans and air-handling units to their respective terminations, outlets, and free discharge openings.
5. Return Air Ductwork: ductwork and duct accessories from duct terminations, grilles, and air inlets to the inlets of the respective fans, return fans, and air-handling units.
6. Exhaust Air Ductwork: ductwork and duct accessories from duct terminations, grilles, and air inlets to the inlets of the respective exhaust fans, and from the discharge of the respective exhaust fans to the discharge termination to outdoors.
7. Transfer Air Ductwork: ductwork and duct accessories, used to rectify an imbalance between supply, return, and exhaust quantities in a space, beginning at the grille or inlet of the air source and terminating at the grille, diffuser, or discharge outlet. Ductwork connected to transfer fans is considered to be supply and return air ductwork as described above.
8. Smoke Exhaust Ductwork: ductwork and duct accessories from the termination or inlet, to the smoke exhaust fan discharge duct termination.

## 1.5 DESIGN CRITERIA

A. Supports, Anchorage, and Restraints:

1. General:
  - a. When supports, anchorages, and seismic restraints for equipment, and supports and seismic restraints for conduit, piping, and ductwork are not shown on the Drawings, the Contractor shall be responsible for their design.
  - b. Seismic restraints and anchorages shall resist seismic forces as specified in the latest edition of the Uniform Building Code, for the seismic zone specified in Section 15050, Basic Mechanical Requirements.
  - c. Seismic restraints shall not introduce stresses in the ductwork caused by thermal expansion or contraction.
  - d. Connections to structural framing shall not introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.
2. Suspended Ductwork: Seismic restraints shall be in accordance with the latest edition of the SMACNA Seismic Restraint Manual - Guidelines for Mechanical



Systems for the seismic hazard level (SHL) as specified in Section 15050, Basic Mechanical Requirements.

3. Engineered Support Systems - The following support systems shall be designed, detailed, and bear the seal of a professional engineer registered in the state of Oregon:
  - a. Supports and seismic restraints for suspended equipment.
  - b. Support frames for ductwork and equipment which provide support from below.
  - c. Equipment and support frame anchorage to supporting slab or structure.

## 1.6 QUALIFICATIONS

- A. Sheet metal work shall be fabricated and installed by qualified, experienced mechanics as specified herein and in accordance with the requirements of ASHRAE and the latest edition of the applicable SMACNA manual.

## 1.7 COORDINATION

- A. The Drawings do not attempt to show exact details of all ductwork. No extra payment will be allowed for obstruction by work of other trades or local obstructions to the work which require offsets. Where diagrams have been made to show duct connections, the Contractor is cautioned that these diagrams must not be used for obtaining material quantities.
- B. Changes in location of equipment or ductwork, advisable in the opinion of the Contractor, shall be submitted to the Engineer for review before proceeding with the work. All measurements and dimensions shall be verified at the site.
- C. Duct sizes shown on the Drawings represent the nominal free area required for that service. Where changes in duct dimensions are necessary to coordinate the installation, the Contractor may change to an equivalent duct area with different dimensions as determined using a Trane Ductulator or Carrier or ASHRAE equivalence charts.
- D. Coordination with Existing Conditions and with Other Trades:
  1. Coordinate the installation of ductwork with existing conditions and the work of other trades to allow the installation of work and the proper operation of blast gate dampers.
  2. Where existing thread rod, strut material, miscellaneous supports, or conduit or piping under 1 inch diameter obstructs the passage of the ductwork, they shall be relocated by the Contractor at no additional cost to the Owner.

## 1.8 SUBMITTALS

- A. Provide the following in addition to the standard requirements:
  1. Shop drawings of suspended ductwork indicating point loads and seismic restraint locations, along with applicable details keyed to layouts.

2. Shop drawings for support frames, equipment and ductwork supports, and associated anchorage and seismic restraints indicating point loads and seismic restraint locations, along with Engineer's calculations and details keyed to the layouts.
  3. Product data for duct accessories.
- B. Test Reports Required Within 1 Week of Date of Test: certificate of test approval by Owner's representative on all systems.

## PART 2 -- PRODUCTS

### 2.1 MATERIALS

- A. Ductwork Materials:
1. Galvanized Steel (GS): hot-dipped GS sheet, lock-forming grade, conforming to ASTM A525 and A527, having G90 zinc coating in conformance with ASTM A90, unless heavier galvanizing is specified.
  2. Hot-Rolled Steel (HRS): HRS sheet, commercial quality, conforming to ASTM A568 and A569, or A366 HRS plate with ASTM A36 hot-rolled structural steel shapes.
  3. Aluminum (AL):
    - a. AL Sheet: Alloy 3003-H14, conforming to ASTM Standard B209.
    - b. AL Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
  4. Stainless Steel (SS): Type 304 or 316 SS sheet, as scheduled, with 2B finish conforming to ASTM A167 and A480; matching type structural members conforming to ASTM A666; Type 316 SS fasteners.
- B. Sealants and Tapes:
1. Duct Sealer - Acceptable Manufacturers:
    - a. United Duct Sealer.
    - b. Duro-Dyne HPS Sealant.
    - c. Vulkem (one part polyurethane) Sealant.
  2. Tape and Adhesive/Activator System:
    - a. Acceptable Manufacturer: Hardcast.
    - b. Description:
      - 1) Hardcast Type DT tape and FTA-20 adhesive.
      - 2) Hardcast shall not be used within cleanrooms or in locations where it is exposed to air that is to be recirculated back to cleanrooms. NASHUA 324 tape shall be used under this circumstance.
  3. Duct Tape - Acceptable Manufacturers:
    - a. United Duct Tape.
    - b. NASHUA 357 silver cloth tape.
  4. Shrink Band (Round Ducts Only) - Acceptable Manufacturer: Raychem.
  5. Silicon Sealant (SS Ductwork Only) - Acceptable Manufacturers:

- a. Clear GE Construction 1200.
- b. Dow 999.

## 2.2 ROUND AND FLAT OVAL SPIRAL LOCK-SEAM HVAC DUCTWORK

### A. Acceptable Manufacturers:

1. Duct:
  - a. United Sheet Metal Company, UniSeal.
  - b. Semco.
2. Fittings:
  - a. United Sheet Metal, Uniform.
  - b. Semco.

### B. Materials: Construct round and flat oval HVAC ductwork and all components and accessories from materials specified on the Drawings, except when the Drawings indicate an alternative material.

### C. Fabrication:

1. General:
  - a. Fabricate ducts using spiral lock-seam construction technique out of sheet material equaling or exceeding the minimum gauge shown in the SMACNA Round Duct Gauge Selection tables and SMACNA Flat Oval Duct Construction table for the duct pressure classifications specified.
  - b. Where the duct diameter is so large that spiral-wound ductwork is not available, longitudinal seam ductwork may be used. Longitudinal seams shall be continuous corrosion-resistant welded seams.
  - c. Paint galvanized coatings that have been damaged by welding with corrosion-resistant paint equal to Rustoleum Gavenoleum 1226.
2. Fittings:
  - a. General: machine-formed, shop-fabricated with continuous corrosion-resistant welded seams.
  - b. Branch Takeoffs: Duct fittings must be a completely separate fitting and not tapped directly into spiral ducts. Saddle fittings are prohibited. Branch takeoffs shall be as shown on the Drawings. Where branch takeoffs are not shown, provide 45 degree laterals or conical tees.
  - c. Branch Takeoffs, Rectangular to Round:
    - 1) 3 Inches WC and Greater Pressure Class: manufactured bell mouth fittings.
    - 2) 2 Inches WC and Lower Pressure Class: conical bell mouth fittings for supply; boot fitting for return and exhaust.
  - d. Transitions, Elbows:
    - 1) Utilize transitions of concentric type or eccentric type to maintain elevations indicated, with not more than 15 degree angle variation on sloped portion.

- 2) Provide 90 degree elbows of five-piece segmented design with centerline radius equal to 1 1/2 of duct diameter minimum.
  - 3) Provide 60 degree and 45 degree elbows of three-piece segmented design with long radius.
  - 4) Elbows 8 inches diameter and smaller may be of the stamped variety with a bead rolled on each end.
  - 5) Contractor-fabricated transitions and elbows are prohibited except where standard fabricated fittings cannot be used and only after review of each specific case by the Engineer.
- e. Joints - Circumferential:
- 1) Provide couplings with centering beads.
  - 2) Flanged joints may be used for connections to equipment, where longitudinal seam ductwork is provided, where flat oval ductwork requires reinforcing, and at other locations where couplings are inappropriate.
  - 3) Crimped end joints are prohibited.

### 2.3 RECTANGULAR HVAC DUCTWORK

- A. Materials: Construct rectangular HVAC ductwork and all components and accessories from materials specified above, except when the Drawings indicate an alternative material.
- B. Fabrication:
1. General: Fabricate ductwork from sheet material equaling or exceeding minimum wall thickness and reinforcing as scheduled in the SMACNA Rectangular Duct Construction Schedules to comply with duct pressure classifications specified. Cross break or bead all duct widths over 12 inches and horizontal surfaces to prevent ballooning or breathing.
  2. Fittings:
    - a. General: Fabricate fittings for easiest airflow.
    - b. Radius Elbows: Fabricate with centerline radius equal to or greater than 1 1/2 times the duct dimension in the plane of the turn.
    - c. Mitered Elbows: Provide with turning vanes as specified under Ductwork Accessories.
    - d. Branch Takeoffs, Rectangular to Rectangular:
      - 1) 3 Inches WC and Greater Pressure Class: Use parallel flow branches where possible. Where branch taps must be made, use 45 degree entry with  $L = 1/4$ , 4 inches minimum.
      - 2) 2 Inches WC and Lower Pressure Class:
        - a) Use parallel flow branches where possible. Where branch taps must be made, use 45 degree entry with  $L = 1/4w$ , 4 inches minimum.
        - b) Extractors fixed at 12 degrees may be used for short runs and shall be used where a supply diffuser or grille is within 5 feet.

- e. Joints:
  - 1) Longitudinal: Pittsburgh lock flooded with mastic prior to assembly. Snaplock is unacceptable.
  - 2) Transverse: Use demountable joint system, such as Ductmate or Nexus, on rectangular ductwork, except where it is impractical. Seal corners prior to assembly.

## 2.4 HVAC FLEXIBLE DUCTWORK

- A. Standards and Listings: comply with NFPA 90A and UL 181 for Class 1 airduct.
- B. Materials:
  - 1. HVAC Application (3 Inches WC and Lower Pressure Class):
    - a. Acceptable Manufacturer: Thermaflex M-KC.
    - b. Wire Helix: zinc-coated, high-carbon steel.
    - c. Interior Liner: acoustical air barrier polymeric lining.
    - d. Insulation: minimum 1-inch-thick blanket of fiberglass, factory installed and bonded to the duct liner.
    - e. Jacket: factory-applied, scuff-resistant, fiberglass-reinforced metallized film laminate vapor barrier; cuffed at both ends for overlap.
    - f. Maximum Length: 7 feet.
    - g. Operating Ratings: 10 inches WC positive pressure, 1 inch WC negative pressure; 4,000-fpm maximum velocity.

## 2.5 DUCT ACCESSORIES

- A. General: Fabricate duct accessories from the same material as the ductwork in which the accessory will be installed, unless specified otherwise.
- B. Manual Splitter Dampers: Fabricated from 18-gauge metal of the same material as the ductwork, with splitters long enough to completely close the branch duct without flutter. Provide a locking quadrant and align its operating handle with the damper blade.
- C. Manual Single Blade Balancing Dampers (2 Inches WC Construction):
  - 1. Fabricate in accordance with SMACNA standards, except as detailed on the Drawings and as specified.
  - 2. Blade, rod, and fastener material shall be the same as the ductwork in which the damper is to be installed.
  - 3. Dampers shall be of a length suitable to shut off branch ducts without causing damper flutter.
  - 4. Cross break dampers and stiffen edges with two edge brakes for rigidity. Provide additional stiffening angles, as required.
  - 5. Provide continuous rods and outside end bearings on all damper assemblies. Additionally, provide inside end bearings on internally lined ducts. Mark the ends of damper rods with a saw cut to indicate blade position.

6. Maximum single blade balancing damper size shall be 12 by 48 inches. Provide manual opposed-blade balancing dampers in ducts wider than 12 inches. Section damper blades over 48 inches wide horizontally.
  7. Provide a specified regulator or locking quadrant for adjustment.
- D. Manual Opposed-Blade Balancing Dampers (2 Inches WC Construction):
1. Fabricate in accordance with SMACNA standards, except as detailed on the Drawings and as specified.
  2. Blade, rod, linkage, frame, and fastener material shall be the same as the ductwork in which the damper is to be installed.
  3. Blades shall be center crimped for stiffness and to receive pins and rods, and edge crimped to interlock with adjacent blades on full shutoff. Provide additional stiffening angles, as required.
  4. Provide a prime coated or galvanized channel frame for mounting of bearings, with angle stops on top and bottom.
  5. Provide continuous rods on all drive damper assemblies. Mark the ends of the damper shaft extension with a saw cut to indicate blade position.
  6. Linkage and hardware shall be SMACNA accepted as manufactured by Ventlok, arranged for gang operation and opposed-blade action without jamming or racking.
  7. Bushings for GS dampers shall be oil-impregnated bronze, sized to match with pins. Bushings for aluminum and stainless steel ductwork shall be nylon.
  8. Blades shall be a minimum of 18-gauge steel or equal strength aluminum. Maximum blade width shall be 12 inches. Provide multisection dampers for dampers over 48 inches wide.
  9. Provide specified locking quadrants for ductwork serving nonclean areas. Provide specified dial regulators for ductwork serving cleanrooms.
- E. Regulators and Quadrants:
1. Acceptable Manufacturers:
    - a. Ventlok as specified.
    - b. Duro-Dyne Specline/Quadline equivalent.
  2. Concealed Accessible Uninsulated Ductwork:
    - a. Ventlok Figure 635 dial regulator.
    - b. Ventlok Figure 555 locking quadrant.
  3. Concealed Accessible Insulated Ductwork:
    - a. Ventline Figures 637 or 639 dial regulator to match insulation thickness.
    - b. Ventline Figure 555 locking quadrant with an elevated standoff of the same height as the insulation thickness.
  4. Concealed Inaccessible Ductwork: Ventlok Figure 677 concealed damper regulator with plain cover, extended rod, and universal joints and miter gears as required.
  5. Exposed Uninsulated Ductwork in Finished Spaces: Hi-Vel Ventlok Figure 640 dial regulator with 609 end bearing.
  6. Insulated Ductwork Serving Cleanrooms:

- a. Ventlok Figure 644 dial regulator with Hi-Vel hardware and Figure 609 end bearings.
  - b. Locking quadrants as specified for noncleanroom areas may be furnished, providing that the damper hardware is airtight at duct penetrations without the use of additional sealants.
- F. Turning Vanes:
1. Acceptable Manufacturers:
    - a. Elgen All-Tight.
    - b. Duro-Dyne Type VR.
  2. Description: hat channel or embossed vane side rails with shop-fabricated, double-blade turning vanes of the same material as the ductwork.
- G. Flexible Connectors:
1. Acceptable Manufacturers:
    - a. Ventfabrics.
    - b. Duro-Dyne.
  2. Indoor Applications:
    - a. Description: Neoprene-coated, fire-retardant woven glass fabric, minimum 30-ounce-per-square-yard density, UL listed, crimped into metal edging strip, with 2-inch minimum clearance between equipment and ductwork, unless otherwise indicated.
    - b. Products:
      - Ventfabrics: Ventglass.
      - Duro-Dyne: Neoprene Metal Fab or Super Metal Fab.
  3. Outdoor Applications:
    - a. Description: Hypalon-coated, fire-retardant woven glass fabric, minimum 24-ounce-per-square-yard density, UL listed, crimped into metal edging strip, with 2-inch minimum clearance between equipment and ductwork, unless otherwise indicated.
    - b. Products:
      - Ventfabrics: Ventlon.
      - Duro-Dyne: Durolon Metal Fab or Super Metal Fab.
- H. Duct Access Doors:
1. Acceptable Manufacturers:
    - a. Ventlok.
    - b. Duro-Dyne.
    - c. Ruskin.
  2. Description:
    - a. Double-wall access door with minimum 1-inch-thick insulation between walls, angle or Z-frame, sealing gasket around the periphery, double layer Plexiglas vision panel with air space between, hinged with Ventlok 100

quick release latches. Access doors smaller than 12 inches square may be secured with sash locks.

- b. Sizes shall be as follows:

Duct Size	Frame Size	Number of Hinges	Access Requirements
6 inches through 8 inches	6 by 8	Two	Hand hole
10 inches	10 by 12	Two	One hand and sight
12 inches through 16 inches	12 by 16	Two	Two hands and head sight
Greater than 16 inches	16 by 24	Three	Body entry

- c. Provide sufficient Ventlok 360 sealant for application between the door frame and duct for installations in ductwork with seal Class A and B, and in ductwork serving cleanrooms.
- d. Patch plates attached with screw fasteners are prohibited, except in locations where they are specifically noted.

I. Fire Dampers for Duct Mounting (FD):

1. Acceptable Manufacturers:
  - a. Ruskin
  - b. Air Balance Inc.
2. Description: curtain type, UL-labeled assembly with frame, interlocking blades, and 165 degree F rated fusible link. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades stored out of the airstream.
3. Provide assemblies rated to maintain the integrity of the rated construction in which the damper is to be installed.
4. Select thin-line damper with nominal 2-inch thick frame for installation in walls between or behind grilles.
5. Select static or dynamic damper according to the system operation.
6. Corrosive Environments: fabricate dampers exposed to corrosive environments from Type 316 stainless steel.

J. Duct Mounted Smoke Detectors:

1. Acceptable Manufacturers:
  - a. Cerberus Pyrotronics.
  - b. Edwards Systems Technology (EST).
  - c. Notifier.
  - d. Simplex.
2. Description: U.L. listed, photoelectric type with sampling tube which completely traverses the duct width.



3. Velocity Range: 300 to 4,000 fpm

## 2.6 DUCT HANGERS AND SUPPORTS

### A. General:

1. Duct hanger and support material gauges shall comply with details on the Drawings. Where details are not provided, comply with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
2. Suspension material may be threaded rod, metal strap, structural shapes, or strut material; however, the use of strap is limited to inaccessible areas or those accessed through a ceiling. The use of wire as suspension material is prohibited.

### B. Upper Attachments:

1. Concrete Construction:
  - a. Cast-in-place inserts as specified in another division of work are acceptable.
  - b. Expanding concrete anchors as specified in another division of work may be used.
  - c. The use of powder-actuated fasteners is prohibited without prior written consent by the Engineer.
2. Steel Construction:
  - a. Acceptable Manufacturers:
    - 1) Fee and Mason Manufacturing Company.
    - 2) Grinnell.
  - b. Support ductwork from structure or supplementary steel, utilizing beam clamps designed for the intended service. Support from metal decks above is prohibited. Provide supplementary steel as detailed and as required.

C. Trapezes: Utilize structural steel shapes or strut material.

D. Support Frames: structural steel shapes or strut frames for support of ductwork, accessories, and HVAC system components, with nuts, bolts, fittings, etc., compatible with the frame material.

## PART 3 -- EXECUTION

### 3.1 FABRICATION AND INSTALLATION

#### A. General:

1. Duct sizes shown on the Drawings are inside duct dimensions and represent the net free area of the duct.
2. Install the entire duct system with a minimum number of bends and transitions.
3. Except where Hardcast or Raychem are applied, seal all non-welded joints with a specified chemical-resistant mastic sealant while joining.
4. Install additional reinforcement to preclude ballooning or breathing of ducts.

- B. Purchased Components: Install ductwork components, such as Duct-Mate, Hardcast, etc., and accessories in accordance with the manufacturers' instructions.
- C. Joints:
  - 1. Assemble round and oval sections using couplings with duct sealer mastic applied to inside and outside of section. After applying mastic, push sections together with 1-inch minimum overlap. Apply a coat of duct sealer mastic over joint and coupling.
  - 2. At the Contractor's option, sections may be assembled with all joints brazed or welded.
  - 3. Hardcast or Raychem shrinkwrap may be used in lieu of mastic and tape system.
- D. Branch Takeoffs:
  - 1. Takeoffs to terminal units shall be the same free area as terminal unit inlet or as shown, whichever is larger.
  - 2. Connect rigidly to terminal unit inlet without flexible duct.
- E. Sound Attenuation (Internal Insulation):
  - 1. Provide sound attenuation duct where shown and as specified under Section 15290, Ductwork Insulation.
  - 2. Duct dimensions shown are net inside attenuating material.
- F. Splitter Dampers: Installation of splitter dampers is restricted to only those locations shown.
- G. Balancing Dampers:
  - 1. Install where shown and where required. Install quadrants or regulators as specified, leaving all dampers locked wide open.
  - 2. Add or remove balancing dampers at the direction of the Engineer or as recommended by the air balancing firm for the necessary control of air in ducted systems.
- H. Turning Vanes: Install in all 90 degree miter elbows.
- I. Flexible Connectors: Make connections to fans and other rotating equipment using flexible connectors with 2-inch minimum clearance between casing and ductwork. Flexible connectors are not required on internally spring-isolated units equipped with internal flexible connectors.
- J. Ducts Through Walls and Floors:
  - 1. Caulk non-fire-rated openings with Minnesota Mining and Manufacturing Company 3M Butyl Sealer.
  - 2. Seal openings through fire-rated partitions with fire sealants.
  - 3. Attach sheet metal collar to duct to neatly cover exposed openings; collar shall tightly fit to surfaces.

- K. Connections to Equipment:
1. Install flanges to match those of connecting factory-fabricated equipment.
  2. Make transitions in ductwork from rectangular to round, or to accommodate the sizes of factory-fabricated equipment, e.g., coils and dampers, using tapered ducts, not by safining.
- L. Duct Access Doors: Provide duct access doors for inspection, cleaning, and maintenance at each fire damper, smoke or ionization detector, electric duct heater, coil, filter, humidifier, automatic damper, fan plenum, and elsewhere as indicated.
- M. Fire and Combination Fire-Smoke Dampers:
1. Install dampers in accordance with NFPA 90A, local building code, and the manufacturer's written recommendations, and the product's UL listing.
  2. Install fire dampers at locations indicated, where ducts and outlets pass through fire-rated construction and where required by authorities having jurisdiction.
  3. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion-resistant springs, bearings, bushings, and hinges.
  4. Install an access door in a serviceable position on the link or latch side of the damper of sufficient size to allow resetting of the damper and replacement of the link. Provide doors compatible with the pressure rating of the duct in which they are installed.
  5. Demonstrate resetting of fire damper to authorities having jurisdiction and to the Owner.
- N. Duct Mounted Smoke Detectors:
1. Install duct mounted smoke detector in accordance with manufacturers written instructions.
  2. Test the differential pressure between sampling tube and ambient to verify manufacturer's requirements.
  3. Fire alarm contractor shall connect the duct mounted smoke detector to the building fire alarm system, as required.
  4. Coordinate smoke detector activation to shut-down the appropriate HVAC equipment in accordance with NFPA 90A requirements.
- O. Painting:
1. Paint all duct stackheads behind diffusers, registers, and grilles with primer and two coats of flat black paint.
  2. Paint exterior exposed ductwork and supports with primer and two coats of exterior flat enamel paint.
- P. Vibration Isolators and Seismic Restraints:
1. Vibration isolation shall be as detailed on the Drawings.
  2. When details regarding seismic restraints are not present, install seismic restraints to comply with the applicable building code for the seismic zone at the site, with

materials and installation in accordance with the applicable SMACNA publication listed in the article titled Design Standards, in Part 1 of this Section.

### 3.2 DUCT HANGERS AND SUPPORTS

#### A. General Support Locations:

1. Install hangers close to transverse joints of main ducts and branches, clinch collar branch connections and the first branch elbows after nested splits.
2. Locate hangers of ducts penetrating walls or partitions as though the walls will contribute no support to the duct.
3. Install hangers in pairs on exact opposite sides of duct. Install duct supports from floors and walls when necessary.
4. Maintain hanger spacing intervals less than, equal to, but not greater than the specified maximums.
5. Install hangers at the midpoint of small and medium size horizontal vaned square elbows. On wide-vaned square elbows, install additional hangers at maximum allowable intervals (or less) measured along the heel lines of the elbows.
6. Provide a set of hangers at the midpoint of small and medium size horizontal radius elbows with greater than 20 degree offset. Install one or more supplementary hangers, as necessary, along the inside and outside arcs of large radius elbows of any angle whenever the lengths of these arcs exceed the maximum hanger spacing length for that particular sized duct.
7. Provide at least one set of hangers for short duct branches 3 feet or less in length.
8. Provide each duct riser with a minimum of two supports completely spanning the shaft opening at each floor. One pair of supports may be used to support more than one duct riser, provided that the strength of the supports is increased appropriately and proper additional supplementary steel is used at the extra risers.
9. Support duct risers, located between floors that are more than 15 feet high, at each floor and halfway points between floors. The distance between intermediate supports on very high floors should not exceed 12 feet (intermediate hangers may be supported from an adjacent wall or hung by rods from supports on the floor above).
10. Provide one or more sets of hangers for equipment in duct runs, such as heating coils, air terminal units, mixing boxes, etc., as recommended by their manufacturers.

#### B. Specific Support Locations - Locate duct hangers:

1. Approximately 2 to 24 inches from flexible connections of fans.
2. Approximately 2 to 24 inches from the outlets or flexible connections of terminal units or mixing boxes.
3. Approximately 12 to 36 inches from the main duct to the first hanger of long branch ducts.
4. Approximately 2 to 12 inches from the ends of all branch ducts and linear diffuser plenums.
5. Approximately 2 to 24 inches from fire damper breakaway joints.

6. Approximately zero inch to half the duct width plus 2 inches from the vertical centerline of the lower elbow of short vertical offsets made with vaned square elbows. The width refers to the dimension of the elbow in the plane of the turn. The heavier the duct, the closer the hanger should be to the centerline of the elbow.
  7. Approximately zero inch to half the duct width plus 2 inches from the vertical centerline of the bottom and top elbows of vaned square elbow offsets over 8 feet high. Diameters of hanger rods of heavy offsets must be increased proportionately. The heavier the duct, the closer the hanger should be to the centerline of the elbow.
  8. Approximately one-eighth of the arc in from the ends of bottom and top radius elbows of vertical offsets longer than 8 feet. Short vertical offsets require hangers at the bottom elbow. Likewise, sloping offsets need at least one set of hangers at their lower radius elbow. Fasten hangers on sloping or arched surfaces to ducts to prevent slippage.
  9. Approximately 6 to 12 inches from transverse joints of ducts whose lengths are the same as specified hanger intervals.
  10. Approximately 6 to 12 inches from one side of walls or partitions penetrated by ducts.
- C. Support Spacing - Maximum Permitted Hanger Spacing:
1. Ducts with areas up to 4 square feet may have their hangers spaced up to 8 feet apart.
  2. Ducts with areas from 4 to 10 square feet may have their hangers spaced not more than 6 feet apart.
  3. Ducts with areas over 10 square feet may have their hangers located up to 4 feet apart.
- D. Support Method:
1. Support low ductwork from floors, or other steel structures acceptable to the Engineer, using struts or structural steel shapes or bars. Where possible, maintain 6 inches clear between the bottom of the duct and the supporting structure.
  2. Support ductwork suspended from overhead using trapeze supports for rectangular ducts, or straps for round ducts with the hanger strap wound completely around the duct. Use threaded rod for support from above.
  3. Use of sheet metal screws for attaching support straps to ducts is prohibited.
- ### 3.3 TEST AND ADJUST
- A. Pressure Testing of HVAC Ductwork:
1. Description:
    - a. Perform a dynamic pressure test on HVAC ductwork systems, where scheduled, using a high-pressure blower with a calibrated orifice and manometer. Provide all necessary blowers, gauges, connections, and similar items required to perform the tests.
    - b. Repair all leaks and retest until stipulated results are achieved.

- c. Advise the Engineer 48 hours in advance of each test. Failure to so notify will require test to be rescheduled.
2. Testing Requirements:

<u>Pressure Class</u>	<u>Seal Class</u>	<u>Test Pressure</u>	<u>Maximum Loss Percent*</u>
2 inches WC	A	2 inches WC	0.5
	B	2 inches WC	1.0
	C	2 inches WC	2.0
3 inches WC	A	3 inches WC	0.5
	B	3 inches WC	1.0
4 inches WC and above	A	6 inches WC	0.5

\*Percent of rated airflow.

### 3.4 ADJUSTING AND CLEANING

- A. Cleaning of General Service Ductwork:
1. Wipe interior and exterior of all ductwork to remove construction dust and manufacturing oil prior to hanging. Seal ends of ductwork after hanging to eliminate collection of construction debris.
  2. Supply ductwork shall be blown clean before final branch connections are made to terminal units, or before terminal grilles, registers, or diffusers are installed. The general-purpose ductwork shall be blown clean with air movement provided by the system fan or blower.
- B. General Cleaning: Clean up and remove refuse material, crates, and rubbish arising from work of this Section from the premises.

### 3.5 SCHEDULE

- A. Fabricate portions of systems listed in the attached schedule from sheet metal with gauge and reinforcement in accordance with SMACNA Duct Construction tables.

## HVAC DUCTWORK SCHEDULE

System	Duct Material	Pressure Class Inches WC	SMACNA Seal Class	Minimum Gauge	Applicable Standard	Pressure Test Required	Remarks
Supply Air Ductwork	GS	2	C	Code	---	No	
Return Air Ductwork	GS	Minus 2	C	Code	---	No	

END OF SECTION

## **Section 15851**

### **Diffusers, Grilles and Registers**

#### PART 1 -- GENERAL

##### 1.1 WORK INCLUDED

- A. This Section specifies the requirements necessary to furnish all equipment, materials and labor required to provide and install, with a finished or exposed appearance compatible with other building finishes, the following: diffusers, grilles, and registers.

##### 1.2 RELATED WORK

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for work specified under this Section.
  - 1. Section 15050 - Basic Mechanical Requirements.
- B. CAUTION: Use of this Section without including all of the above-listed items will result in omission of basic requirements.
- C. In the event of conflict regarding diffusers, grilles, and registers requirements between this Section and any other section, the provisions of this Section will govern.

##### 1.3 QUALITY ASSURANCE

- A. Test and rate performance of air outlets and inlets in accordance with the latest version of ASHRAE 70, Method of Testing for Rating the Performance of Air Outlets and Inlets.

##### 1.4 SUBMITTALS

- A. Provide the following within 3 weeks of execution of the Contract:
  - 1. Product data sheets for all insulation, liners, and adhesives.
  - 2. Manufacturer's instructions for installation.

#### PART 2 -- MATERIALS

##### 2.1 GENERAL

- A. Air Motion Performance: Select devices based on air being introduced into the room at 25 degrees F temperature differential and being diffused at the 5-foot level to a velocity not greater than 50 fpm, with a temperature uniformity of not greater than 1.5 degrees F.



- B. Acoustical Performance: Select devices that do not exceed the following criteria.
- C. When devices are specified to include a damper for volume adjustment, acoustical performance shall be achieved with the damper 50 percent closed.
- D. Callout Designation: outlets and inlets specified under this Section are indicated by a callout indicated on the Drawings.
- E. Pattern Designation: the pattern designation indicates the core style for diffusers with optional cores that determine pattern of throw. The pattern of throw may not be indicated for diffusers with field-adjustable pattern control.
  - 1. Throw arrows indicate the direction of throw if other than four-way.
  - 2. Provide diffusers with the pattern and direction of throw indicated. When the pattern designation is left blank and direction-of-throw arrows are absent the pattern shall be four-way, except for slot and linear diffusers, which shall be two-way, with equal volume in each direction.

## 2.2 CEILING DIFFUSERS, GRILLES, AND REGISTERS

- A. Ceiling Supply Diffuser (CD):
  - 1. Acceptable Manufacturers:
    - a. Price, Model SMCD
    - b. Titus, Model MCD
  - 2. Features: adjustable modular core for 1, 2, 3, or 4-way flow pattern.
  - 3. Frame: 24-inch by 24-inch face with steel frame for lay-in ceiling mounting.
  - 4. Finish: white.
  - 5. Accessories: provide opposed blade balancing damper if diffuser is located in a inaccessible ceiling.
- B. Ceiling Return Grille (CR):
  - 1. Acceptable Manufacturers:
    - a. Price, Model PDDR
    - b. Titus, Model PAR
  - 2. Features: perforated face with round outlet, size as indicated on the Drawings.
  - 3. Frame: mount in 24-inch by 24-inch or 24-inch by 12-inch, steel frame with steel border as required for lay-in ceiling mounting.
  - 4. Finish: white.
  - 5. Accessories: round outlet connection.
- C. Sidewall Supply Register (SR):
  - 1. Acceptable Manufacturers:
    - a. Price, Model 520
    - b. Titus, Model 300 FL
  - 2. Features: louvered supply grille, double deflection, 3/4-inch blade spacing, size as indicated on the Drawings.

3. Frame: steel construction, surface mounted.
  4. Finish: white
  5. Accessories: neck mounted opposed blade damper.
- D. Sidewall Return Register (RR):
1. Acceptable Manufacturers:
    - a. Price, Model 530
    - b. Titus, Model 350 RL
  2. Features: louvered return grille, 35-degree deflection, 3/4-inch blade spacing, size as indicated on the Drawings.
  3. Frame: steel construction, surface mounted.
  4. Finish: white
  5. Accessories: neck mounted opposed blade damper.

### PART 3 -- INSTALLATION

#### 3.1 INSPECTION

- A. Inspect all equipment for damage upon delivery, and immediately report damage to the Owner. Repair damaged equipment to like-new condition or replace if damaged beyond repair.

#### 3.2 FIELD PREPARATION

- A. Store equipment indoors in a secure area off the ground in a manner allowing easy inspection and inventory.

#### 3.3 INSTALLATION

- A. General Considerations:
1. Install items in accordance with manufacturer's instruction.
  2. Install diffusers, grilles, and registers tight on their respective mounting surfaces. Install plumb and true with room dimensions, accurately centered on projections, recesses, windows, ceiling grids, light fixtures, or doors. Provide appropriate frames wherever necessary to adapt to mounting surface.
  3. Make airtight connections to ductwork.
  4. Install extractors on all duct-mounted diffusers, behind all duct-mounted supply grilles, and where shown. Turning vanes are acceptable if the condition is the last outlet on a branch.
  5. Paint ductwork visible behind air outlets and inlets matte black.
- B. Special considerations for Ceiling Diffusers: Where flexible ductwork is used to make connections to ceiling diffusers, install a minimum of three duct diameters of straight ductwork without bends immediately upstream of the diffuser to provide uniform air distribution at the inlet collar. If this cannot be achieved, install an insulated sheet metal,

90 degree inlet box with turning vanes on the diffuser inlet. Turning vanes are not required if modular core diffusers are supplied.

#### 3.4 ADJUSTING AND CLEANING

- A. Remove debris; vacuum dust from installed materials. Remove by manufacturer's recommended method.

END OF SECTION



## Section 15952

### Air Systems Testing

#### PART 1 -- GENERAL

##### 1.1 WORK INCLUDED

- A. This Section specifies the requirements for services required to measure, test and adjust, and record, complete, the air system capacities to match design conditions for airflow capacity and space pressurization. The air systems to be tested, adjusted, and balanced may include but are not limited to:
  - 1. General purpose and comfort air handling systems.
  - 2. General purpose and building exhaust systems.
  - 3. Process exhaust systems.
  - 4. Smoke/emergency evacuation purge systems.
- B. Refer to the HVAC Specifications on the drawings for specific equipment and systems to be adjusted.

##### 1.2 RELATED WORK

- A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for the testing, adjusting and balancing of the air systems.
  - 1. Section 15050 - Basic Mechanical Requirements.
- B. CAUTION: Use of this Section without including all of the above-listed items will result in omission of basic requirements.
- C. In the event of conflict regarding the requirements for testing, adjusting and balancing the listed systems between this Section and any other section, the provisions of this Section shall govern.

##### 1.3 QUALIFICATIONS

- A. All air systems shall be tested and adjusted under the direct supervision of a qualified and certified air balancer, by an independent firm specializing in air system testing and balancing. Tests shall be performed in accordance with the standard procedures and practices of the Associated Air Balance Council (AABC) or the National Environmental Balancing Board (NEBB).
- B. Firms proposing on this service shall have been in business for a minimum of 5 years, and shall specialize in air system testing and balancing work.

- C. The Air Balance Contractor's Project Manager shall have a minimum of 5 years of experience testing and adjusting building air handling systems, as well as 2 years of experience testing as a field supervisor. The project manager shall supervise all aspects of field measurements, select appropriate tests, consult with the Engineer on technical matters, and approve the test report.
- D. The Air Balance Contractor's field supervisor shall have a minimum of 2 years of experience testing and adjusting air handling systems as a field engineer or field technician. The field supervisor shall supervise all field technicians assigned to complete the testing and adjusting of the Work covered by this Section, and shall be responsible for all onsite testing and data acquisition. No field tests shall be taken without the field supervisor's presence.
- E. All field technicians shall have completed previous training in building mechanical systems and air balancing procedures, shall have worked in this capacity on at least one other similar project, and shall only work under direct supervision of the field supervisor.

#### 1.4 SUBMITTALS

- A. Provide the following in addition to the standard requirements:
  - 1. If requested, provide to the Owner a Proposal, where scheduled at the end of this Section:
    - a. Qualifications of all field technicians, the field engineer, the project manager, and the Air Balance Contractor.
      - 1) A list shall be available upon request of projects similar in size and complexity to this project that the firm has completed. Include the project name, description of mechanical system, range of services provided, size, and the name and phone number of the Design Consultant or Owner who had responsibility for final inspection and acceptance of the service.
      - 2) A list shall be available upon request of projects similar to this project that the project manager has managed and/or adjusted.
    - b. Written presentation outlining the testing, adjusting, and balancing procedures to be performed.
    - c. Description of all instrumentation and test equipment to be used, as well as calibration documentation.
    - d. Samples of all field reports, charts, and forms proposed to document measured conditions. A sample test report for a similar project shall be available for inspection by the Engineer to verify the Contractor's expertise in data collection and interpretation.

2. Required following the Bid, before commencement of Construction work:
  - a. Submit field data collection forms to be used for the air balance work. Forms shall be filled out with all specified design values for the project, following a thorough review of the HVAC system design by the Air Balance Contractor, and shall include the following as a minimum:
    - 1) Each air moving equipment item, air terminal unit, and air inlet or outlet shown or noted on the project documents.
    - 2) Specified design values of airflow, static pressure, horsepower etc. for each.
  - b. The purpose of this submittal is to provide the Air Balance Contractor with opportunity to identify system design issues which may negatively impact the ability of the system to perform as intended, and to so notify the Mechanical Contractor and the Engineer.
  - c. If such design issues are identified, the Air Balance Contractor shall describe the issue, possible consequences, and a suggested change to the design to mitigate the issue.
  - d. Forms shall be submitted to the Mechanical Contractor and the Engineer.
3. Required at Completion of Balancing Work:
  - a. Provide the following in both hard-copy and electronic form: Orderly computer-typed field reports, charts, and forms completed with all measured data.
  - b. Provide the following in hard-copy form: Reduced set of architectural and/or HVAC floor plan drawings, maximum size 11 by 17 inches, showing all sample points referred to on other field data sheets.
  - c. Provide the following general report format:
    - 1) All forms shall be submitted on standard 8 1/2 by 11 good quality paper, except as noted above for drawings, and be bound together to form a complete report.
    - 2) All forms shall be submitted in typewritten form; handwritten forms are not acceptable, except that neat hand annotation on report drawings shall be acceptable.
    - 3) Cover or title sheet shall list name, address, and location description of the project, and names of air conditioning contractor, architect, and engineer.
    - 4) A separate sheet shall provide a list of all instrumentation and test equipment actually used in the balancing process, including manufacturer, model, and last calibration date.
    - 5) Describe all tests performed, including the purpose, instrumentation, procedure, results, and analysis of the data. All data shall be properly presented and graphically displayed as required to permit full understanding of all tests.
    - 6) Document the dates tests were taken and the names of field supervisors and technicians performing the tests.

- 7) Describe the operating condition of all general purpose and clean areas served by the systems balanced.
  - 8) Provide a separate section in the report outlining any operating or balancing problems remaining at the end of the testing and adjusting procedures. Describe the condition and its effect on the room temperature, humidity, or pressurization levels and the recommended remedies.
  - 9) Test forms used by balancing engineers and technicians shall be set up to include the following information on each sheet:
    - a) Type of instruments used to perform tests.
    - b) Name or initials of test technician or test supervisor.
    - c) Dates of tests.
  - 10) Each Diffusers, Grilles, and Registers sheet shall include the following items:
    - a) Each sheet shall include the information described under Article "AIR BALANCE CONTRACTOR GENERAL AIR BALANCING PROCEDURES" in this Section.
    - b) Sheet shall be organized in column form to allow ready comparison between design values, initial test values, and final values.
  - 11) Air Handling Equipment Test Sheets shall be provided as follows:
    - a) Each sheet shall contain two Sections. One shall list specified or required conditions and the other shall list test conditions obtained. Sections shall be formatted similarly to allow ready comparison of design and measured values.
    - b) Sheets shall include information described under Article "AIR BALANCE CONTRACTOR GENERAL AIR BALANCING PROCEDURES" in this Section:
  - 12) Each report shall contain a reproduction of the system HVAC design drawings or a single-line drawing of scheduled air distribution systems with fan system and zone number indicated. Each and every outlet, supply, and return shall be indicated on this drawing by a number corresponding to the number on the outlet test sheet, enabling the engineer to locate each outlet for this drawing. Drawing shall be clear and neat and shall list name and location of the job, and date of report.
- d. Four hard copies and one electronic copy of the completed Air Balancing Report shall be submitted for the Owner's review and acceptance.

## PART 2 -- PRODUCTS

### 2.1 MATERIALS AND TESTING EQUIPMENT

- A. The Air Balance Contractor shall supply all materials, tools, equipment, and instrumentation required to perform the air system balancing as described in this Section.



- The Engineer may consider alternative equipment and methods. Submit proposals with the bid.
- B. The mechanical contractor shall supply all materials, tools, equipment, and instrumentation required to perform the pre-balancing testing and adjusting.
  - C. All test equipment used in the testing and balancing procedure shall be precision instruments recognized by the industry as being applicable for the intended use. Calibration of equipment shall be traceable to NBS standards within the previous 12 months.
  - D. Airflow velocity measurements shall be taken with a calibrated air measuring cone. In areas where an air measuring cone is not practical, a Velgrid velocity instrument, registered by Shortridge Instruments, will be accepted to take direct velocity measurements at the face of the ceiling filter.
  - E. Room pressure differential tests shall be taken with a portable electronic micro-manometer.
  - F. Where required on the schedule at the end of this Section, temperature uniformity tests shall be performed using a twelve channel multipoint electronic temperature recording and data logging panel. Temperature recording equipment shall be Yokogawa multipoint recorder, with amplifier and thermocouple to provide 0.01 degrees F resolution.
  - G. Where required on the schedule at the end of this Section, humidity uniformity tests shall be performed using a dielectric thin-film capacitor humidity sensor. Humidity equipment shall be Vaisala relative humidity sensor.

### PART 3 -- EXECUTION

#### 3.1 EXAMINATION

- A. Where scheduled at the end of this Section, the field supervisor for the Air Balance Contractor shall visit the jobsite for knowledge of the installation, inspection, and completion of the installations. Site visit shall be for the minimum time period scheduled, and performed during the construction work and prior to commencing with balancing work.

#### 3.2 PREPARATION

- A. Pre-balancing Conference: Prior to commencing with balancing, the Air Balance Contractor shall meet with the Owner's Authorized Representative, and the Engineer, to review the systems and the balancing procedures, and to ensure that the Air Balance Contractor has a full understanding of the Owner's requirements.

- B. Equipment Verification:
1. Identify all equipment to be tested.
  2. Verify that the equipment installed corresponds with the latest shop drawings and that ducting and piping correspond with the latest plans. Notify the Engineer of any deviations that may cause underperformance.
  3. Record the installed size, type, manufacturer, rating, and capacity of all equipment to be tested, including air outlets and inlets.

### 3.3 MECHANICAL CONTRACTOR PREBALANCING TESTING AND ADJUSTING

- A. Test and Report Forms:
1. Air Handling Equipment Test Sheets:
    - a. Each sheet shall contain two columns. One shall list specified or required conditions and directly opposite shall list conditions obtained.
    - b. Sheets shall list the following items:
      - 1) System fan or air terminal unit number.
      - 2) Fan or air terminal unit manufacturer.
      - 3) Fan rpm.
      - 4) Size of fan sheave.
      - 5) Size of motor sheave.
      - 6) Belt size and number.
      - 7) Motor manufacturer.
      - 8) Motor size, voltage.
      - 9) Motor phase, rpm, and hp.
      - 10) Motor nameplate full-load amps.
      - 11) Motor operating full-load amps.
      - 12) Motor starter heater size data.
      - 13) List of all automatic dampers included in or served by unit, with verification of proper operation for each.
      - 14) Verification of the following (Yes/No):
        - a) All manual dampers have been checked for proper operation, and left in the full-open position.
        - b) All fire or fire/smoke dampers are in the full-open position.
        - c) All registers, grilles, and diffusers are installed and set to proper blow pattern.
        - d) Adjustable-pitch pulleys have been checked and serviced as required.
        - e) Fan drive alignment has been checked and adjusted as required.
        - f) Air handler casing has been cleaned.
        - g) Supply-air, outside-air, and return-air ductwork served by air handler has been cleaned.
        - h) Air handler filters have been installed prior to startup.
        - i) Fan bearings have been checked for grease; if grease has been added, document manufacturer, type, and part number.
      - 15) Fan performance curves.

- B. Test Requirements - Air: The Mechanical Contractor shall perform the following tests and adjust systems in accordance with the following requirements:
1. Test and adjust fan rpm to specified design requirements.
  2. Test and record motor full-load amperes.
  3. Verify each grille, diffuser, and register for location, size, and discharge pattern.
  4. In cooperation with the control manufacturer's representative, set adjustment of automatically operated dampers to operate as specified, indicated, and/or noted. Verify that dampers operate smoothly, open completely, and close off tightly.
  5. Verify that all manual dampers and other balancing devices as called for in the construction documents are properly installed, indexed, and in good working order.
  6. Set all manual balancing dampers, valves, and balancing valves at 100 percent open position.
  7. Verify that all fire dampers or fire/smoke dampers are open.
  8. Verify that all adjustable pitch pulleys are properly adjusted and tightened in their correct initial settings for specified fan rpm, and in clean and un-rusted condition so as to be capable of later adjustment by the Air Balance Contractor. If required to facilitate later adjustment, pulleys shall be removed from the motor shaft, the shaft and pulley threads cleaned and lightly oiled, and pulley remounted, aligned, and properly adjusted.
  9. Clean interior of all plenums, casings, and ducts and install all filters, including high-efficiency filters, before starting systems.
  10. Install clean prefilters in all systems prior to start of Owner's final air balance.
  11. Verify that all control systems are calibrated and functioning properly.
  12. Check fan bearings for grease.
  13. Check all motor starters and verify that the heaters sizing is correct, taking length of electrical feeders into consideration. Record amps and heater sizes on all motors.
  14. Check out, adjust, and align all equipment drives before starting and readjust before Owner's final balancing.
  15. Provide fan performance curves for all fans.

### 3.4 AIR BALANCE CONTRACTOR GENERAL AIR BALANCING PROCEDURES

- A. General:
1. The Air Balance Contractor shall adjust systems using the General Procedures that follow. Refer to other articles in this Section for procedures specific to cleanrooms.
  2. Adjust air systems in accordance with standard procedures and recognized practices of the AABC or NEBB.
  3. Correction of fan and airflow adjustments for the jobsite elevation will not be required; jobsite elevation may be assumed to be sea-level for purposes of air balancing. Duct layouts and airflow values shown may be assumed to be corrected from standard air conditions for air temperature by the design Engineer as

- necessary for proper heat transfer. The balance logs shall indicate the recorded jobsite values.
4. Air volumes shown are initial settings and some empirical adjustment may be required to achieve desired operation. The Air Balance Contractor shall obtain approval from the Engineer or Owner before performing any additional work required for such adjustments, shall clearly document the issue, and the time and costs required to resolve it.
  5. Below-Spec Performance due to Existing Conditions:
    - a. The project scope may include modifications to existing systems. In such cases, the Air Balance Contractor shall adjust the existing equipment and systems scheduled at the end of this Section, in accordance with the specified standard procedures and recognized practices, in an effort to obtain the specified performance.
    - b. Where specified performance cannot be obtained due to existing system conditions, the Air Balance Contractor shall diagnose the issue and recommend to the Mechanical Contractor and the Engineer possible measures to obtain specified performance.
    - c. Beyond this initial diagnosis and recommendation effort, further work to address below-spec performance shall be negotiated with the Contractor and/or Owner as appropriate, using the established project change process.
  6. Documenting Existing Conditions:
    - a. Where indicated on the schedule at the end of this Section, the Air Balance Contractor shall document performance of the existing equipment and systems scheduled, prior to commencement of any system demolition work. Unless otherwise noted, documentation detail shall be equivalent to that specified for new systems.
- B. Equipment:
1. Air Moving Equipment:
    - a. Provide documentation and testing for every air handlers, supply fan, return fan, and exhaust fan affected by the project.
    - b. For new equipment installed as part of the project, and for existing equipment where so indicated on the schedule at the end of this Section, document the following equipment design and nameplate data for each equipment item:
      - 1) Equipment identification number.
      - 2) Fan information (for each fan):
        - a) Manufacturer.
        - b) Size and model.
        - c) Rpm.
      - 3) Supply, return, outside, and exhaust air cfm, as applicable.
      - 4) Internally recirculated air cfm (e.g., for air handler vestibule cooling), where applicable.
      - 5) Static pressures: total, suction, and discharge (as available).
      - 6) Motor information (for each motor):

- a) Manufacturer.
- b) Horsepower
- c) Voltage
- d) Phase
- e) Full-load amps.
- f) Service factor.
- g) Starter and heater data.
- 7) Belt drive data where applicable, including the following:
  - a) Size of fan sheaves.
  - b) Size of motor sheaves.
  - c) Belt sizes and quantities.
- c. Coil and heater data where applicable, including the following:
  - 1) Entering air DB and WB temperature.
  - 2) Leaving air DB and WB temperature.
  - 3) Entering coil water temperature.
  - 4) Leaving coil water temperature.
  - 5) Coil fluid (water, type of glycol, percent concentration, etc.).
- d. Unless otherwise indicated on the schedule at the end of this Section, document the following existing and nameplate data for each existing air moving equipment item which is affected by project-related changes to zone or room airflows:
  - 1) Equipment identification number.
  - 2) Fan rpm (for each fan):
  - 3) Motor information (for each motor):
    - a) Horsepower
    - b) Voltage
    - c) Phase
    - d) Full-load amps.
    - e) Service factor.
    - f) Starter and heater data.
  - 4) Belt drive data where applicable and where unit shutdown can be performed to allow evaluation:
    - a) Size of fan sheaves.
    - b) Size of motor sheaves.
- e. For all tests and adjustments, document data for each test taken, including “final” condition.
- f. Adjust fan speeds (rpm), active wheel widths, or blade settings as appropriate to obtain design equipment air volumes, with allowable variation of plus 10, minus 0 percent.
- g. Where applicable, test and adjust each internal recirculating system (e.g., for air handler vestibule cooling) for design airflow, and record final values.
- h. Perform airflow test readings under simulated or actual conditions of maximum cooling, maximum heating, minimum outside air, maximum outside air and exhaust, and maximum return air.

- i. Test and record motor full-load amperes. After final fan adjustments, motor amp draw shall not exceed nameplate amperage on any phase.
  - j. Make all drive and belt changes, furnishing belts and sheaves as required to adjust equipment to the specified conditions, at no additional cost to Owner. Provide written notice to the Owner and to all air handler manufacturers if any drive or belt changes were made.
  - k. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified, indicated, and/or noted, to provide design airflow at all outside air dampers, supply dampers, return air dampers, bleed off air dampers, and exhaust air dampers.
  - l. For fan systems which employ economizer cycle for free cooling, readings shall be taken for 100 percent O.S.A. and minimum O.S.A. with the supply fan operating at maximum airflow.
  - m. Where applicable, the Air Balance Contractor shall coordinate work with the air measuring products manufacturer to ensure the following:
    - 1) Supply and return air fans are adjusted for proper tracking.
    - 2) Duct static pressure set points are documented; actual duct static pressure at sensor locations are measured and recorded.
    - 3) Supply and return fan differentials are documented.
  - n. Test and record static pressure readings at the following locations:
    - 1) Each unit inlet and discharge.
    - 2) On inlets and outlets of fans, filters, coils, dampers, and plenums.
    - 3) Calculate and note pressure drop or rise for each component.
  - o. Adjust main supply and return air duct dampers as available and required to provide design zone airflows. Where required to facilitate air balance, perform pitot tube traverse of main supply ducts and record measured values.
  - p. Perform temperature tests for all air handler coils and heaters where applicable, measuring and documenting the following for each:
    - 1) Entering air DB and WB temperature.
    - 2) Leaving air DB and WB temperature.
    - 3) Entering coil water temperature.
    - 4) Leaving coil water temperature.
    - 5) Outside air - DB and WB temperature.
2. Air Terminal Units:
- a. Perform final setting of air terminal unit volumes using the HVAC control system (building automation system). Set and document final maximum and minimum airflow setpoints and reported values, damper position (% open), and fan-powered terminal unit fan setting (where applicable) at each.
  - b. Where design airflows cannot be obtained, or airflow values reported by the HVAC control system vary by more than 10% from the total airflow measured at the air outlets served by the terminal unit, diagnose the airflow discrepancy by performing the following as required:

- 1) Measure the difference between inlet and discharge static pressures to assure that sufficient pressure differential exists for the terminal unit to operate in control. Record inlet and outlet static pressures with terminal units set to design maximum air volume
- 2) Verify that terminal unit controls are operating properly, that stroke is from full open to full close, and that operation is smooth and without binding. If corrective measures are required, notify the controls installer.
- 3) Verify that sensors are free of blockage and sensing a fully developed air flow profile.
- 4) Where upstream conditions prevent accurate readings by the unit-mounted flow sensors, measure the air volume using a pitot traverse at an alternate location where accurate readings may be taken. Only in the absence of an acceptable traverse point may methods such as sums of the outlets, downstream pitot traverse, and mixed temperature be used to determine terminal unit air volume.
- 5) Document room thermostat setting and actual room temperature reading

C. Outlets and Inlets:

1. Document each grille, diffuser, and register as to fan system and terminal unit serving it, location, and area. Provide a unique identification number keyed to plan drawings provided in the balancing report.
2. Document size, type, and manufacturer of each diffuser, grille, and register. Use manufacturer's ratings to make required calculations.
3. For each inlet or outlet, document design airflow, and measured cfm for each test.
4. Test and adjust each diffuser, grille, and register to design airflow with allowable variation of plus 10, minus 0 percent.
  - a. Where direct reading of airflow is not possible (i.e., using a flow hood), readings and tests of diffusers, grilles, and registers shall include required velocity and test resultant velocity.
  - b. Where airflow must be determined using measured velocity, provide documentation of manufacturer's effective area for the inlet or outlet.
5. Adjust diffusers, registers, and grilles for proper deflection, throw, and coverage. Check for drafts and noise, and eliminate where possible. Adjust diffusers installed as four-way blow to three-way or two-way blow if required to eliminate collision of airstreams, and if the configuration of the installed diffuser permits.
6. Mark final positions of all balancing dampers with felt pen. Recommend addition or replacement of dampers as necessary to obtain proper air control. When major adjustments are made to a portion of any fan system, all other portions of that same system must be reread to determine the effects imposed by the adjustments.

### 3.5 ACCEPTANCE CRITERIA

A. Verification Procedures:

1. After all adjustments have been completed and the balance logs submitted, the Air Balance Contractor may be required to demonstrate the air balancing procedures used to the Owner's Authorized Representative and the Engineer. If required by the Engineer, perform spot tests on a maximum of 20 percent of the total diffusers and grilles at random points selected by the Owner's Authorized Representative, and on all air handlers, using testing equipment used in the original measurements.
  2. Agreement between spot test results and the balancing logs shall be within 10 percent. Where results are not within tolerance, rebalance portions of the system until results are achieved. At the completion of the rebalance procedures, perform another spot test if required by the Owner's Authorized Representative to demonstrate compliance.
  3. The Air Balance Contractor field supervisor shall present and review all field data with the Owner's Authorized Representative and the Engineer to educate the Owner's staff regarding the base operating condition of the air handling systems.
- B. Documentation: The Air Balance Contractor field supervisor shall oversee any changes or corrections required of the final report, then affix the field supervisor's professional stamp to the final sets signifying his approval of the final certification log.

END OF SECTION



## COMMERCIAL LAVATORIES AND SINKS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Commercial Sink

#### 1.02 REFERENCE STANDARDS

- A. ASMEA 112.19.3
- B. CSA B45.4

#### 1.04 QUALITY ASSURANCE

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

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Elkay Manufacturing Company: [www.elkay.com](http://www.elkay.com).
- B. Substitutions: See Section 01 60 00 - Product Requirements.

#### 2.02 MATERIALS

- A. Conference Room Sink: 18 gauge Stainless Steel
  1. Mounting: Universal (top or undermount).
  2. Finish: Satin.
  3. Depth: 8 inches, maximum
  4. Overall Size: 25 inches x 22 inches.
  5. Faucet holes: (3) 1 1/2 inch diameter holes, minimum.
  6. Drain opening: 3 1/2 inch rear center opening.
  7. Product:
    - a) Elkay Signature Plus Stainless Steel Bowl Dual/Universal Mount Sink, Model HD322425
    - b) Substitutions: See Section 01 60 00 - Product Requirements.
- B. Conference Room Faucet:
  1. Mounting: Deck.
  2. Finish: Stainless Steel or Chrome.
  3. Holes: Compatible with selected sink.
  4. Handle Type: Lever or Paddle.
  5. Spout reach: 8 inches, minimum.
  6. Spout height: 5 3/4 inches, minimum.
  7. Compliance: ADA Compliant.
  8. Product:
    - a) Elkay Single Handle Kitchen Faucet with Spray, Model LK2478CR
    - b) Substitutions: See Section 01 60 00 - Product Requirements.

#### 2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide compatible drain, trap, faucet hole covers, and mounting brackets as required.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Proceed with installation only after unsatisfactory conditions in installation area have been corrected.
- B. Prior to installing sink and faucet, make certain that surfaces to which adhesive will be applied are clean and free of dust, dirt, and other residues that would inhibit a proper bond.

**3.02 INSTALLATION**

- A. Install sink and faucet in accordance with manufacturer's instructions.
- B. Accurately plumb, horizontal and in-line.
- C. Ensure installation is compliant with side-reach ADA requirements.

**3.03 PROTECTION**

- A. Fixture damaged during construction replaced with new and perfect fixtures without expense to Owner. Protect fixture and trim finish during construction with suitable covering.

**END OF SECTION**

## GENERAL ELECTRICAL PROVISIONS

### PART 1 - GENERAL

#### 1.01 CONTRACT CONDITIONS

- A. Work of this Section is bound by General Conditions, Supplementary Conditions, and Division 1 bound herewith in addition to this Specification and accompanying Drawings.
- B. The Drawings and Specifications are complementary and what is called for by one shall be as binding as if called for by both.
- C. The Contractor shall inspect the job site prior to bidding and become familiarized with existing conditions which will affect the work.
- D. Prior to start of work, obtain "As built," "Record," or other Drawings showing existing conditions or underground utilities.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Comply with requirements herein where other Divisions call for Work under this Division of Specifications. Electrical Work required by other Divisions not shown on Electrical Drawings or specified in this Division of Specification shall be provided by trade or sub-trade requiring Electrical Work.

#### 1.03 DESCRIPTION OF SYSTEM

- A. Electrical Drawings are diagrammatic and do not necessarily show all raceways, wiring, number and types of fittings required.
- B. Provide all related Electrical Work specified herein and diagrammed or scheduled on Electrical Drawings. All work shall conform to applicable national, state, and local codes. Contractor is responsible for installation of complete and operating electrical systems.

#### 1.04 QUALITY ASSURANCE

- A. Qualifications of Installers:
  - 1. For actual fabrication, installation and testing of Work of this Section, use only thoroughly trained and experienced personnel familiar with requirements for this Work and with installation recommendations of Manufacturers of specified items.
- B. Design Criteria:
  - 1. Conform Work with conditions shown and specified.
  - 2. Where adjustments or modifications of Work are necessary for fabrication and installation of items, or for resolution of conflicts between items, make such adjustments at no added expense to Owner.
  - 3. Submit adjustments or modifications of Work affecting functional or aesthetic design of Work to Architect for review.
  - 4. Pay for equipment relocations or modifications necessitated by failure to advise Architect of conflicts or coordinate work.
- C. Select equipment to meet design conditions stated. Contractor is responsible for meeting technical data and performance requirements of system.
- D. Satisfy requirements of regulatory agencies or codes having jurisdiction over project. Provide U.L. labels for all equipment falling under testing capabilities of U.L.

- E. Procure licenses and permits, and pay fees, deposits, assessments and tax charges required for Electrical Work.
- F. Arrange for and pay for inspections and tests required by codes and ordinances during construction.

**1.05 REFERENCE STANDARDS**

- A. The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and from a part of this specification to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of Invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.
  - 1. Underwriters Laboratories (UL).
  - 2. National Fire Protection Association (NFPA), Specifically:
    - a. NFPA 70 - National Electric Code.
    - b. NFPA 72 - National Fire Alarm Code.
    - c. NFPA 101 - Life Safety Code.
    - d. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
  - 3. National Electrical Safety Code.
  - 4. International Mechanical Code (IMC) with State of Oregon Amendments.
  - 5. International Building Code (IBC) with State of Oregon Amendments.
  - 6. International Fire Code (IFC) with State of Oregon Amendments.
  - 7. National Electrical Manufacturer's Association (NEMA).
  - 8. American National Standards Institute (ANSI).
  - 9. National Electrical Testing Associations (NETA).
  - 10. Occupational Safety and Health Administration (OSHA).
  - 11. City, County, and State Codes and Ordinances.
- B. Provide shop drawings and product data in accordance with Division 1.
- C. Submittal material sent by facsimile machine will not be accepted.
- D. Post Contract Award:
  - 1. Prepare and submit as follows:
    - a. Provide complete drawings, diagrams, illustrations, performance charts, brochures, and/or other data which adequately describes product to enable thorough evaluation.
    - b. Number of copies, method of distribution, format and schedule for submission; per Supplementary Conditions or Division 1.
- E. Provide product data for materials and equipment as required by individual sections.
- F. Provide Shop Drawings for materials and equipment as required by individual sections.

**1.06 SUBSTITUTIONS**

- A. Substitution requests will not be considered unless they are submitted in writing, in accordance with Instructions to Bidders, Supplementary Instructions to Bidders, and Division 1.
- B. Products specified herein are so specified to establish a minimum level of product quality. Except where indicated that no substitutions are allowable, equivalent quality products may be submitted to the Architect for approval.
- C. Substitution requests will not be considered unless they include the following:
  - 1. Model numbers of proposed substitutions.
  - 2. Options which are required to make the proposed substitution comply with Specifications.
  - 3. Summary of modifications of the Work which are required to accommodate the proposed substitution.

**1.07 RECORD DRAWINGS**

- A. Provide in accordance with Division 1.

**1.08 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Make inspection of equipment for possible damage at time of delivery to avoid future delays in construction due to replacement or repair.
- B. Protect against damage, theft and deterioration.
  - 1. Store in original factory containers.
  - 2. Do not expose equipment to dust, powder, abrasive, wetness, excessive dampness or temperature extremes, unless equipment approved for that use.
- C. In event of damage, immediately make all repairs and/or replacements necessary to approval of Architect, at no additional expense to Owner.

**1.09 PROTECTION**

- A. Suitably protect any unfinished Work from potential physical damage.
- B. Do not leave unfinished Work unattended, which would pose life safety hazard.
- C. Protect other Work against damage and discoloration caused by Work of this Section.

**1.10 COORDINATION**

- A. Provide coordination for the Work of this Division in accordance with Division 1.
- B. Report any discrepancies discovered between existing job conditions and Work to be installed. Fully resolve such discrepancies prior to continuation of work.
- C. Coordinate sequencing of equipment installation and energizing with other trades.
- D. Consult Architect prior to installing equipment in area which obviously exceeds, or will exceed, ambient operating requirements such as for temperature and humidity.

**1.11 ALTERNATIVES AND ALLOWANCES**

- A. Refer to Division 1 for possible effect upon Work of this Section.

**1.12 WARRANTY**

- A. Warrant all Work included in this Specification for period of one year from date of substantial completion, under provisions of Division 1.
- B. During warranty period, remedy without delay or expense to Owner any defects providing, in judgment of Engineer, that such defects are not result of misuse or abuse on part of Owner.
- C. Warrant that all equipment and installations are in compliance with OSHA regulations.

**PART 2 - PRODUCTS**

**2.01 MATERIAL**

- A. Provide new material and equipment items that are standard products of Manufacturers regularly engaged in production of such materials and equipment. Architect reserves right to reject items not in accordance with Specifications.

- B. For each type of equipment, use same manufacturer throughout.
- C. Provide corrosion protection for ferrous metalwork exposed to weather by hot dip galvanizing, or factory painted finish suitable for outdoor installations.
- D. Verify all materials are acceptable to Authority having jurisdiction, as suitable for the use intended.

### **PART 3 - EXECUTION**

#### **3.01 COMPLETION**

- A. Complete each system as shown or specified herein and place in operation, except where only roughing-in or partial systems are called for.
- B. Outlets or equipment shown on the plans, with no supply conduit or conductors indicated, shall be completed in the same methods and manner as similar or like outlets or equipment shown on the drawings.

#### **3.02 SCHEDULING OF WORK**

- A. Schedule Work with all other Contractors to maintain job progress schedule, and avoid conflicts in installation of Work by various trades.
- B. Coordinate with General Contractor to provide adequate access for installing large equipment.

#### **3.03 SLEEVES AND OPENINGS**

- A. Provide through floors and walls for Electrical Work.
- B. Coordinate with General Contractor and other trades involved.
- C. Patch and seal around all openings, both sides of material penetrated where possible.

#### **3.04 CUTTING AND PATCHING**

- A. See Division 1.
- B. Inform General Contractor of all openings required in building construction for installation of Work.
- C. Where access within or behind existing surfaces is required by the work of this Section, remove, cut, patch reinstall, and refinish surfaces and assemblies as required to restore them to their previous and/or scheduled finish condition.

#### **3.05 PAINTING**

- A. See Division 9.
- B. Painting of Electrical Work shall be performed by General Contractor.
- C. Painting of Electrical Work not included in Electrical Work, unless otherwise noted on Drawings or specified herein.
- D. Coordinate with General Contractor.

#### **3.06 MANUFACTURER'S INSTALLATION DETAILS**

- A. Follow exactly, where available.

**3.07 ACCESSIBILITY OF EQUIPMENT**

- A. Install equipment accessible for operation, maintenance or repair as required by NEC.
- B. Inaccessible Equipment:
  - 1. Where the Owner's representative determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as directed, at no additional cost to the Owner.
  - 2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and ductwork.

**3.08 COORDINATION**

- A. Coordinate all light fixture and device locations with other trades to avoid possible conflicts with ducts, sprinkler piping, and other obstacles affecting installation.
- B. Coordinate conduit, junction boxes, supporting equipment, etc. Affecting normal operating and maintenance activities related to mechanical equipment, piping, valves, accessories, etc.

**3.09 TESTS**

- A. Fully test and adjust equipment installed under this specifications prior to Owner's personnel instruction. Each system shall be left in proper operation free of faults, shorts or unintentional grounds.
- B. Do not test or operate for any other purpose, such as checking motor rotation, any item of equipment until fully checked in accordance with Manufacturer's instructions.

**3.10 CLEANING OF ELECTRICAL INSTALLATION**

- A. See Division 1.
- B. Prior to acceptance of building, thoroughly clean all exposed portions of electrical installation.
- C. Remove all nonessential labels and traces of foreign substances.
- D. Use only cleaning solution approved by Manufacturer.
- E. Avoid any damage to finished surfaces.

**3.11 EQUIPMENT CONNECTIONS**

- A. Provide a complete electrical connection for all items of equipment including incidental wiring, materials, devices and labor necessary for a complete operating system. The location and method for connecting to each item of equipment shall be verified prior to rough-in. The voltage and phase of each item of equipment shall be checked before connecting. Motor rotations shall be made in the proper direction. Pump motors are not to be test run until liquid is in the system and proper lubrication to all bearings in unit is checked.

**END OF SECTION**





## **MINOR ELECTRICAL DEMOLITION**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Electrical demolition.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS AND EQUIPMENT**

- A. Materials and Equipment for Patching and Extending Work: As specified in individual sections.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify field measurements and circuiting arrangements are as shown on Drawings. Report discrepancies to Architect before proceeding with demolition work.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities. Report discrepancies to Architect before disturbing existing installation.

#### **3.02 PREPARATION**

- A. Verify that abandoned wiring and equipment serve only abandoned facilities. Report discrepancies to Architect before disturbing existing installation.
- B. Interrupt power only to make connections or switchovers.
  - 1. Obtain permission from Owner before scheduling partial or complete outages.
  - 2. Schedule each outage at least 24 hours in advance.
  - 3. Keep outages as short duration as possible and make temporary connections if required to maintain service to areas adjacent to work area.
  - 4. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

#### **3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Remove, relocate, and extend existing installations as required to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit.
- D. Disconnect abandoned outlets and remove devices. Provide blank cover for abandoned outlets where conduit system is not removed.
- E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing electrical installations which remain active.
  - 1. Modify installation or provide access panel as appropriate.

- H. Extend existing installations using materials and methods compatible with existing electrical installations.
- I. Check branch circuit wiring disturbed in execution of this Work which is to remain for continuity, overloads and grounds. Repair any deficiencies.
- J. Existing outlets indicated on drawings to be removed or to remain, are shown for general information only and do not indicate exact location or total number of outlets involved.
- K. All salvage materials shall remain property of Owner and shall be stored at location designated by Owner, unless otherwise noted by Architect.
- L. Prior to acceptance of the building, thoroughly clean exposed portions of the electrical installation, removing labels and traces of foreign substance, using only a cleaning solution approved by the manufacturer and being careful to avoid damage to finished surfaces.

**END OF SECTION**

## WIRE AND CABLE

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Building wire and cable.
- B. Wiring connections and terminations.

#### 1.02 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 26 01 00.
- B. Submit manufacturer's instructions.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS - WIRE

- A. Rome
- B. General Cable
- C. Anaconda-Erickson
- D. Southwire
- E. General Electric
- F. Substitutions: Under provisions of Section 260100.

#### 2.02 BUILDING WIRE

- A. Feeders and Branch Circuits:
  - 1. Copper conductor.
  - 2. 600 volt insulation.
  - 3. THHN/THWN Not less than 98% conductivity.
  - 4. Stranded conductor.
- B. Color Coding:
  - 1. 120/208 Volt System:
    - a. A phase - black.
    - b. B phase - red.
    - c. C phase - blue.
    - d. Neutral - white.
    - e. Ground - green.

### PART 3 - EXECUTION

#### 2.03 GENERAL WIRING METHODS

- A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 16 AWG for control wiring.
- B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet.

- C. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
- D. No shared neutrals. Provide one neutral for each phase conductor in branch circuits.
- E. Splice only in junction or outlet boxes.
- F. Neatly train and lace wiring inside boxes, equipment, and panelboards using cable ties.
  1. Manufacturer: T&B Ty-Rap, or approved.

**2.04 WIRING INSTALLATION IN RACEWAYS**

- A. Pull all conductors into a raceway at the same time.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Pull wiring in a manner that will avoid kinking or abrasion of the insulation.
- D. Use only approved lubricants when pulling conductors.
- E. Do not exceed pulling tension or bending radius recommended by wire manufacturer.
- F. Equipment Grounding Conductors:
  1. Provide a separate, insulated equipment grounding conductor in lighting and receptacle branch circuits.
  2. Terminate each end on a grounding lug, bus, or bushing.
  3. Provide individual ground wire in flexible conduit and non-metallic raceways.

**2.05 CABLE INSTALLATION**

- A. Provide protection for exposed cables where subject to damage.
- B. Support cables 12" minimum above accessible ceilings.
- C. Use spring metal clips or plastic cable ties to support cables from structure or ceiling suspension system.
- D. Include bridle rings or drive rings.
- E. Use suitable cable fittings and connectors.
- F. Install cables in conduits where installed in walls or other inaccessible spaces.

**2.06 WIRING CONNECTIONS AND TERMINATIONS**

- A. Splice only in accessible junction boxes.
- B. #8 Copper Wire and Smaller:
  1. Use solderless spring connectors with insulating covers.
  2. Manufacturer: Buchanan, Ideal, Scotch, or approved.
  3. Connection by means of wire binding screws or studs and nuts having upturned lugs or equivalent shall be permitted for No. 10 solid or smaller conductors only.
- C. Thoroughly clean wires before installing lugs and connectors.
- D. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.
- E. Terminate spare conductors with electrical tape.

**2.07 FIELD QUALITY CONTROL**

- A. Inspect wire and cable for physical damage and proper connection.
- B. Torque test conductor connections and terminations to manufacturer's recommended values.
- C. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

**2.08 WIRE AND CABLE INSTALLATION SCHEDULE**

- A. Interior Locations: Building wire in continuous metallic raceways, as shown on Drawings.
- B. Cross marks for power and lighting branch circuits installed in raceways indicate quantity of number 12 copper branch circuit conductors unless otherwise noted. Where no cross marks appear on power or lighting circuits it shall be understood to provide two (2) number 12 conductors for lighting and three number 12 conductors for receptacle circuits.
- C. Conductor sizes indicated, such as home run annotations, shall be maintained through out entire circuit length.

**END OF SECTION**



## **SUPPORTING DEVICES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Conduit and equipment supports.
- B. Fastening hardware.

#### **1.02 COORDINATION**

- A. Coordinate size, shape, and location of concrete pads with Division 3.

#### **1.03 QUALITY ASSURANCE**

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIAL**

- A. Support Channel: Zinc plated.
- B. Hardware: Corrosion resistant.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Equipment Support From Building Structure:
  - 1. Precast insert system.
  - 2. Expansion anchors.
  - 3. Preset inserts.
  - 4. Beam clamps.
  - 5. Spring steel clips.
  - 6. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
  - 7. Do not use powder-actuated anchors.

#### **3.02 SEISMIC REQUIREMENTS**

- A. Equipment anchorage and supports:
  - 1. All equipment shall be securely anchored to the building and properly supported to resist the forces of a Seismic Zone 3 event at the site.
  - 2. Anchorage for equipment subject to thermal expansion shall be in accordance with recommendations of the manufacturer.
  - 3. Anchors and fasteners shall sized to resist shear and overturning moments caused by the anticipated seismic forces.

**END OF SECTION**





**CONDUIT****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Electrical metallic tubing and fittings.
- B. Flexible metal conduit and fittings.

**PART 2 - PRODUCTS****2.01 ELECTRIC METALLIC TUBING (EMT)**

- A. Zinc coated by hot dip galvanizing or sherardizing.
- B. Manufacturer: Allied Tube and Conduit, Triangle PWC Inc., or approved.

**2.02 FLEXIBLE CONDUIT**

- A. Galvanized steel or aluminum, abrasion resistant.
- B. Manufacturer: Anamet (Type DE-710), Triangle PWC, Inc. (Type 710), or approved.

**2.03 CONNECTIONS AND FITTINGS**

- A. Especially for purpose used.
- B. Same material and finish as raceway.

**2.04 COUPLINGS AND CONNECTORS FOR ELECTRICAL METALLIC TUBING (EMT)**

- A. Exterior / Interior: Raintight compression type, employing split corrugated ring and tightening nut.
- B. Interior: Set-screw type shall be permitted:
  - 1. Screws must be visible and accessible after installation.
- C. Manufacturer: Appleton, Raco, Thomas & Betts, or approved.
- D. Cast connectors and couplings are not allowed.

**2.05 CONDUIT HANGERS AND SUPPORTS**

- A. One-hole or two-hole push-on straps or one-hole clamps.
  - 1. Manufacturer: Appleton, Raco, Thomas & Betts, or approved.
- B. Fastener designed for the purpose may be used in wood or metal stud construction or for support from ceiling tees, ceiling support wires, channel, or beams.
  - 1. Manufacturer: Caddy, B-Line, or approved.
- C. No Drive-nail type anchors in concrete or masonry. Use plastic anchors with screws or para-bolts (sleeve anchor studs).

**PART 3 - EXECUTION****3.01 CONDUIT SIZING AND ARRANGEMENT**

- A. Size conduit for Type THW conductors. Minimum conduit size for home runs to panelboards is 3/4 inch. Individual branch circuits to device or fixture locations may be run in 1/2 inch conduit.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
- D. Maintain minimum 6 inch clearance between conduit and mechanical piping if practical. Coordinate installation with other trades. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- E. Maintain 12 inch clearance above removable ceiling tiles.
- F. Run minimum 3/4" conduit from each network faceplate location to existing cable tray in accessible ceiling area.

**3.02 CONDUIT SUPPORT**

- A. Arrange conduit supports to prevent distortion of alignment by wire pulling operations.
- B. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- C. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps.
  - 1. Provide space for 25 percent additional conduit on conduit racks.
- D. Do not fasten conduit with wire or perforated pipe straps.
- E. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- F. Exposed conduit and tubing attached directly to building surface, use one hole galvanized steel pipe clamps.
- G. Conduit and tubing in metal stud walls shall be supported by fasteners approved for the purpose.
- H. Conduits rising vertically between studs shall be supported by approved fasteners attached to supports horizontally secured between studs for multiple runs and shall be offset and attached to vertical stud, by an approved fastener, for single runs.
- I. Wire suspension systems above suspended ceilings:
  - 1. Support conduits above suspended ceilings from structure.
  - 2. Provide a dedicated support wire system for conduits.
  - 3. Use fasteners and support hardware designed for the purpose.
  - 4. Do not support conduits from ceiling support wires.
- J. Hanger Spacing:
  - 1. Do not exceed 8 foot 0 inches on center.
  - 2. Provide one hanger adjacent to each outlet box, and one hanger within 12 inches on each side of a change in direction.
- K. Conduits not permitted to be supported from ducts, pipes or other systems foreign to electrical installation.

- L. Support conduit as close to ceiling structure as practical. Coordinate conduit location with other trades.
- M. Attachment of one hole straps on horizontal runs shall be from above.

**3.03 CONDUIT INSTALLATION**

- A. Cut conduit square using a saw; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Install no more than the equivalent of four 90 degree bends between boxes.
- D. Use conduit bodies to make sharp changes in direction, as around beams.
- E. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-1/4 inch size.
- F. Avoid condensation between moist warm locations and cool locations by blocking air flow in conduit with "Duct Seal" or similar material.
- G. Thoroughly clean interior of conduits.
- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- J. Install expansion joints where conduit crosses building expansion or seismic joints.

**3.04 CONDUIT PENETRATIONS**

- A. Fire-Rated Walls and Floors: Seal conduit penetrations using one of the following methods:
  1. Provide mechanical fire-stop fittings with UL listed fire rating equal to wall or floor rating.
  2. Seal opening around conduit with UL listed foamed silicone elastomer compound.
- B. Non Fire-Rated Walls: Silicone RTV foam membrane permitted.

**3.05 FLEXIBLE CONDUIT**

- A. Use limited to the following:
  1. Lighting fixture pigtailed to remote junction box in accessible ceilings.
  2. Interior motor connections.
  3. At building expansion joints.
  4. Vibrating or movable equipment connections.
  5. Flexible conduit may not be installed in stud walls in new construction.
  6. Flexible conduit may be fished in stud walls.
- B. Provide separate ground conductor full length of flexible conduit or outside of conduit.

**3.06 ELECTRICAL METALLIC TUBING**

- A. Dry locations where not subject to damage.
- B. Concealed in non-masonry/concrete walls or ceiling.
- C. Exposed runs above 8 feet in non-protected areas.

**END OF SECTION**



**SURFACE RACEWAYS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface raceways.
- B. Multi-outlet assemblies.

**1.02 RELATED SECTIONS**

- A. Section 26 27 26 - Wiring Devices: Receptacles.
- B. Section 27 30 00 - Telephone/Data Communication Network Wiring Systems.

**1.03 SUBMITTALS**

- A. Submit product data under provisions of Section 26 01 00.
- B. Include product data for surface metal raceways, surface non-metal raceway, multi-outlet assemblies, auxiliary gutters, and accessories.

**PART 2 - PRODUCTS****2.01 ACCEPTABLE MANUFACTURERS - SURFACE RACEWAYS**

- A. Wiremold.
- B. Hubbell.
- C. Panduit.
- D. Mono Systems.
- E. Thomas and Betts.
- F. Substitutions: Under provisions of Section 260100.

**2.02 SURFACE RACEWAY**

- A. Surface Metal Raceway: Sheet metal channel with fitted cover, suitable for use as surface metal raceway. Basis of design: Wiremold – Type and size as noted on drawings.
- B. Finish: Ivory where installed on finished walls, Gray where installed on concrete surface.
- C. Fittings: Entrance end fittings, radius inserts, couplings, elbows, and connectors designed for use with raceway system.
- D. Boxes and Extension Rings: Designed for use with raceway systems.

**2.03 MULTI-OUTLET ASSEMBLY**

- A. Multi-outlet Assembly: Sheet metal channel extruded aluminum channel, or plastic channel with fitted cover, receptacles and data outlets as scheduled, suitable for use as a multi-outlet assembly.
- B. Wiremold 4000

- C. Size: 4.75" x 1.75"
- D. Finish: Ivory where installed on finished walls, Gray where installed on concrete surface.
- E. Fittings: Couplings, elbows, entrance end fittings, radius inserts, and connectors designed for use with multi-outlet system.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION - SURFACE RACEWAY, MULTI-OUTLET ASSEMBLY**

- A. Routing of raceways and multi-outlet assemblies:
  - 1. In general route surface metal raceways at locations to minimize the architectural impact of the surface.
  - 2. Avoid installing surface raceway across open wall or ceilings.
  - 3. Install runs adjacent to architectural elements.
  - 4. Install vertical runs on walls adjacent to door/window frames, casework or adjacent to inside corners.
  - 5. Route horizontal runs on walls at top of base molding.
  - 6. Route on ceilings adjacent to walls where ever possible.
- B. Use flat-head screws to fasten channel to surfaces.
- C. Mount plumb and level.
- D. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
- E. Maintain grounding continuity between raceway components to provide a continuous grounding path.
- F. Fastener Option: Use clips and straps suitable for the purpose.
- G. Use of surface raceways restricted to areas where indicated on Drawings or where concealed wiring methods are impractical. Authorization of Architect/Engineer required for installation of surface raceway not indicated on Drawings.
- H. Provide quantity of branch circuits to multi-outlet assemblies as indicated on Drawings.

**END OF SECTION**

**OUTLET, PULL AND JUNCTION BOXES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

**1.02 RELATED SECTIONS**

- A. Section 08305 - Access Doors: Wall and ceiling access doors.
- B. Section 26 27 26 - Wiring Devices: Service fittings and fire-rated poke-through fittings for floor boxes.
- C. Section 26 27 60 - Cabinets and Enclosures.
- D. Section 26 27 80 - Equipment Wiring Systems.

**1.03 PROJECT CONDITIONS**

- A. Verify Field measurements are as shown on drawings.

**1.04 SUBMITTALS**

- A. Submit product data under provisions of Section 26 01 00.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURERS - OUTLET BOXES**

- A. Bowers.
- B. Raco/Bell.
- C. Steel City.
- D. Thomas and Betts
- E. Substitutions: under provisions in Section 260100.

**2.02 OUTLET BOXES**

- A. Sheet Metal Outlet Boxes: Galvanized steel
- B. Cast Boxes: Aluminum or cast ferrous alloy, deep type, gasketed cover, threaded hubs.

**2.03 ACCEPTABLE MANUFACTURERS - PULL AND JUNCTION BOXES**

- A. Circle AW.
- B. Hoffman.
- C. Rittal.

- D. Substitutions: under provisions of Section 26 01 00.

## **2.04 PULL AND JUNCTION BOXES**

- A. Sheet Metal Boxes: Galvanized steel.
- B. Sheet Metal Boxes Larger Than 18 Inches in Any Dimension: Hinged enclosure.

## **PART 3 - EXECUTION**

### **3.01 COORDINATION OF BOX LOCATIONS**

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. Locate and install boxes to allow access. .

### **3.02 OUTLET BOX INSTALLATION**

- A. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24 inch separation in acoustic-rated walls.
- B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings.
- D. Support boxes independently of conduit.
- E. Support boxes above suspended ceilings from structure. Provide dedicated support wires for boxes as required by NEC 300
- F. Use multiple-gang boxes where more than one device are mounted together: do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- G. Install boxes in walls without damaging wall insulation.
- H. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes with architectural drawings.
- I. Position outlets to locate luminaires as shown on reflected ceiling plans.
- J. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.
- K. Provide recessed outlet boxes in finished areas: secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- L. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

**END OF SECTION**



## **ELECTRICAL IDENTIFICATION**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Wire and cable markers.
- C. Pull box and junction box identification.
- D. Device plate identification.

#### **1.02 RELATED SECTIONS**

- A. Section 26 27 26 - Wiring Devices.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Nameplates:
  - 1. Engraved three-layer laminated plastic.
  - 2. White letters.
  - 3. Black background.
- B. Wire and Cable Markers:
  - 1. Heat shrink thermo-labels. Brady or Panduit.
- C. Labels:
  - 1. Adhesive Film Labels: Machine printed, in black on clear background, by thermal transfer or equivalent process.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Degrease and clean surfaces to receive nameplates.
- B. Install nameplates parallel to equipment lines.
- C. Secure nameplates to equipment fronts using screws or drive rivets.
  - 1. Secure nameplate to inside face of recessed panelboard doors in finished locations.
  - 2. Secure nameplate to inside face of panelboard doors in unfinished locations.
- D. Use stick-on characters for identification of individual wall switch and receptacle cover plates.

#### **3.02 WIRE IDENTIFICATION**

- A. Provide wire markers on each conductor in panelboards pull boxes, and at load connection.
- B. Identify with branch circuit or feeder number for power and lighting circuits.
- C. Identify control wire number as indicated on equipment manufacturer's shop drawings.

#### **3.03 NAMEPLATE ENGRAVING SCHEDULE**

- A. Identify all electrical distribution and control equipment and disconnect switches at loads served.

- B. Letter Height:
  - 1. 1/8 inch for individual switches and loads served.
  - 2. 1/4 inch for distribution and control equipment identification.
  - 3. 1/8 inch identifying voltage rating and source.

**3.04 PULL BOX AND JUNCTION BOX IDENTIFICATION**

- A. Identify each junction box with complete system description. Examples:
  - 1. Telephone.
  - 2. 208 V system.
- B. Optional Methods:
  - 1. Neat hand lettering with permanent black marker.
  - 2. Engraved nameplates.
  - 3. Stick on labels.
- C. Locations:
  - 1. On outside of box cover where concealed.
  - 2. In exposed box locations, locate on inside of box cover.
  - 3. Identify main pull boxes by number and indicate numbers on record drawings.

**3.05 DEVICE PLATE IDENTIFICATION:**

- A. 1/8 inch letter height.
- B. Black letter color.
- C. Location:
  - 1. Bottom center of device plate for single gang and bottom center of device for multiple gang outlets.
    - a. Provide branch circuit identification (such as "C-37" to indicate Panel "C" Circuit #37) at bottom center of device plate.

**END OF SECTION**

**LIGHTING CONTROL EQUIPMENT**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Occupancy Sensors.
- B. Daylight Sensors.
- C. 924 Power Loss Relays.
- D. 0-10 Volt Dimmers.

**1.02 SUBMITTALS**

- A. Submit product data under provisions of Section 26 01 00.
- B. Submit manufacturers' instructions under provisions of Section 26 01 00.

**PART 2 - PRODUCTS**

**2.01 OCCUPANCY SENSORS**

- A. Approved manufacturers:
  - 1. Wattstopper.
  - 2. System Sensor.
  - 3. Lutron
  - 4. Approved substitution.
- B. Compatible with electronic loads.
- C. No minimum load requirement.
- D. Wall mounted dual technology:
  - 1. 180 degree sensing
  - 2. 900 square foot coverage
  - 3. Adjustable sensitivity and time delay
- E. Ceiling dual technology:
  - 1. 180 degree coverage
  - 2. Adjustable sensitivity and time delay
  - 3. Additional single pole, double throw isolated relay outputs

**2.02 DAYLIGHT SENSORS**

- A. Approved manufacturers:
  - 1. Wattstopper.
  - 2. System Sensor.
  - 3. Lutron.
  - 4. Approved substitution.
- B. Compatible with LED driver loads.
- C. 0-10VDC Control.
- D. Two zone control in Corridor, two zone control in office area.

**2.03 924 POWER LOSS RELAYS**

- A. Approved manufacturers:
  - 1. Wattstopper.
  - 2. System Sensor.
  - 3. Hubbell
  - 4. Lutron
  - 5. Substitution per Section 26 01 00.
- B. Tested and approved under UL 924.
- C. Normal power source: Locally switched lighting circuit. Emergency source: Existing exit sign circuit. Sensing source: Normal unswitched room lighting circuit.
- D. Loss of normal power shall connect light fixtures noted on drawings to emergency circuit.

**PART 3 - EXECUTION**

**3.01 OCCUPANCY SENSORS**

- A. Interconnect sensors with power supplies using cable. Install cable open in concealed building spaces. Install cable in raceways when installed on building surfaces.
- B. Install sensors and accessories per manufacturer's recommendations.
- C. Select and locate sensors to provide 100% area coverage.
- D. Adjust sensor to turn off area lighting circuit(s) if unoccupied for a period of 15 minutes.
- E. Provide conduit and wiring as required for circuiting area lighting circuit(s) to power pack.

**3.02 OCCUPANCY AND DAYLIGHT SENSORS**

- A. Interconnect sensors with power supplies using cable. Install cable open in concealed building spaces. Install cable in raceways when installed on building surfaces.
- B. Install sensors and accessories per manufacturer's recommendations.
- C. Adjust sensor to turn dim area lighting circuit based on available daylight to maintain 20 footcandles in corridor areas and 30 footcandles in office areas.
- D. Provide two daylight zones in office area and two zone control in corridor.
- E. Provide conduit and wiring as required for circuiting area lighting circuit(s) to power pack.

**3.03 924 POWER LOSS RELAYS**

- A. Wire relays in accordance with manufacturer's recommendation.
- B. Normal position: switched / dimmed normal source lighting circuit. Power loss position: unswitched circuit from building emergency panel.

**END OF SECTION**

## PANELBOARDS

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Lighting and appliance branch circuit panelboards.

#### 1.02 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Section 260100.
- B. Include:
  1. Outline and support point dimensions.
  2. Voltage.
  3. Main horizontal and vertical bus ampacity and size.
  4. Integrated short circuit ampere rating.
  5. Circuit breaker arrangement and sizes.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Square D NQO series.

#### 2.02 LIGHTING AND APPLIANCE PANELBOARD RETROFIT

- A. Enclosure:
  1. Mount new panel interior in existing 20" wide x 34" high flush mounted enclosure.
  2. Provide new hinged door cover.
- B. Bussing:
  1. Copper bus, ratings per one line diagram.
  2. Provide copper ground bus in all panelboards.
  3. Minimum Integrated Short Circuit Rating: 10000 amps AIC
  4. Bussing shall be sized in accordance with UL 891 limited to a heat rise of 65° C.
- C. Molded Case Circuit Breakers:
  1. Bolt-on type thermal magnetic molded case with quick-make, quick-break action.
  2. Common trip handle (no external brackets) for all poles with "ON," "OFF," and "TRIPPED" positions.
  3. UL listed as Type SWD for lighting circuits.
  4. Minimum Integrated Short Circuit Rating: 10000 amps AIC.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install new panel interior in existing cabinets, where noted on drawings.
- B. Existing cabinet dimensions (Assumed) : 20" wide x 34" high x 5 ¾" deep. Verify exact dimensions prior to ordering panel retrofit equipment.
- C. Provide filler plates for unused spaces in panelboards.

- D. Provide deadfront and hinged door trim assembly.
- E. Trace existing circuits to verify existing circuitry. Provide typed circuit directory for each branch circuit panelboard.
- F. Measure current load with all lighting. Consolidate lighting circuits where noted on panel schedules.

**3.02 FIELD QUALITY CONTROL**

- A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Revise directory to reflect circuiting changes required to balance phase loads.
- B. Visual and Mechanical Inspection:
  - 1. Inspect for physical damage, proper alignment, anchorage, and grounding.
  - 2. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

**END OF SECTION**

**WIRING DEVICES****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Receptacles.
- C. Device plates and box covers.

**1.02 RELATED SECTIONS**

- A. Section 26 05 32 - Outlet, Pull and Junction Boxes.
- B. Section 26 05 53 - Electrical Identification.

**1.03 SUBMITTALS**

- A. Submit product data under provisions of Section 26 01 00.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

**1.04 SUBSTITUTIONS**

- A. Products specified herein are so specified to establish a minimum level of product quality as determined by the engineer. Except where indicated no substitutions are allowable, equivalent quality products may be submitted to the Architect for approval, under provisions of Section 26 01 00.

**PART 2 - PRODUCTS****2.01 ACCEPTABLE MANUFACTURERS - WALL SWITCHES AND RECEPTACLES**

- A. Hubbell.
- B. Leviton.
- C. Arrow Hart.

**2.02 WALL SWITCHES**

- A. AC general use quiet type switch with toggle handle. Ivory.
- B. 20 amp rating, 120-277 volts.
- C. Self-grounding type
- D. Hubbell 1221 Series.

**2.03 RECEPTACLES**

- A. Convenience and straight blade receptacles.
  - a. Isolated Ground Receptacles 125 volt, 20 amp, Hubbell IG 5362
  - b. Ivory

**2.04 ACCEPTABLE MANUFACTURERS WALL PLATES**

- A. Hubbell.
- B. Leviton.
- C. P&S/LeGrand.
- D. Substitution: under provisions of Section 26 01 00.

**2.05 WALL PLATES**

- A. Decorative Cover Plate:
  - 1. Ivory smooth, rigid impact resistant, nylon/thermo-plastic.

**PART 3 - EXECUTION****3.01 INSTALLATION**

- A. Switches:
  - 1. Wall switches 48 inches above floor to top of box.
  - 2. OFF position down, unless otherwise noted.
  - 3. Derate ganged dimmer switches as instructed by manufacturer.
  - 4. Dimmer switches shall not use common neutral.
- B. Receptacles:
  - 1. 18 inches above floor, unless otherwise noted.
  - 2. 6 inches above counters, unless otherwise noted.
  - 3. 3 inches above backsplash, unless otherwise noted.
  - 4. Grounding pole on bottom.
  - 5. Verify exact height and orientation of outlets with Architectural Details prior to rough-in.
  - 6. Provide 20 amp rated receptacles.
- C. Plates:
  - 1. Decorative plates on switch, receptacle, and blank outlets in finished areas.
  - 2. Install device and wall plates flush and level.
  - 3. Where outlets are adjacent to each other at same mounting heights, install under common device plate, except when outlets are of different voltages, such as telephone and duplex receptacle, unless otherwise noted.
- D. Communication Outlets:
  - 1. Provide mudring at each network faceplate and cable TV outlet locations.
  - 2. Stub  $\frac{3}{4}$ " conduit with bushings at both ends from mudring location to accessible ceiling space.
  - 3. Provide new J ring supports at locations shown on drawings for communication wiring.

**END OF SECTION**



## LIGHT FIXTURES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Interior luminaires and accessories.
- B. Lamps.
- C. Ballasts and Drivers.
- D. Relocated Light Fixtures

#### 1.02 RELATED SECTIONS

- A. Section 262726- Wiring Devices.

#### 1.03 SUBMITTALS

- A. Submit product data under provisions of Section 260100.
- B. Include outline drawings, lamp and ballast data, support points, weights, and accessory information for each luminaire type.
- C. Submit manufacturer's installation instructions under provisions of Section 260100.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 260100.
- B. Store and protect products under provisions of Section 260100.

#### 1.05 JOB CONDITIONS

- A. Existing Conditions:
  - 1. Prior to ordering lighting fixtures, verify finish material in locations where lighting fixtures are mounted.
  - 2. Prior to ordering lighting fixtures, verify conditions for mounting lighting fixtures and select proper mounting hardware.
  - 3. Verify configuration of fixtures scheduled for relocation and provide any additional accessories required for installation at new location.

### PART 2 - PRODUCTS

#### 2.01 INTERIOR LUMINAIRES AND ACCESSORIES

- A. See Luminaire Schedule.
- B. Lighting Fixture Construction:
  - 1. Light leaks not accepted. Fixture designed or gasketed to eliminate light leaks.
  - 2. Surface mounted fixture with surface conduit: Constructed with knockouts or collars to allow fixture mounting tight to ceiling. Fixtures not allowed to mount on surface boxes, unless otherwise noted.
  - 3. Parabolic louvers for fluorescent fixtures, and parabolic and elliptical reflectors for downlights shall have low iridescent finish.
- C. LED Luminaire Components: UL 8750 recognized or listed as applicable.

**2.02 ACCEPTABLE MANUFACTURERS - LAMPS**

- A. General Electric.
- B. Osram/Sylvania.
- C. Philips.
- D. Cree.
- E. Substitutions: Under provisions of Section 260100.

**2.03 LAMPS**

- A. Fluorescent T8 Lamps:
  1. See Luminaire Schedule.
  2. All by same manufacturer.
  3. Specification/Designer Series.
  4. 3500K correlated color temperature, unless otherwise noted.
  5. Minimum color rendering index of 80.
- B. LED A lamps
  1. 360 degree light distribution, A lamp configuration.
  2. 3500K correlated color temperature, unless otherwise noted.
  3. Minimum color rendering index of 80.
  4. See Luminaire Schedule.
  5. All by same manufacturer.

**2.04 BALLASTS AND DRIVERS**

- A. Manufacturers:
  1. General Electric Company/GE Lighting.
  2. Lutron Electronics Company.
  3. Osram Sylvania.
  4. Philips Lighting Electronics/Advance.
  5. Substitutions: Under provisions of Section 260100.
  6. Manufacturer Limitations: Where possible, for each type of luminaire provide ballasts produced by a single manufacturer.

**2.05 DIMMABLE LED DRIVERS:**

- A. Dimming Range: Continuous dimming from 100 percent to five percent relative light output, without flicker.
- B. Control Compatibility: Fully compatible with the dimming controls to be installed.
- C. 0 – 10 VDC controls through daylight sensor and / local dimming switch.
- D. Submit compatibility report from dimming control manufacturer indicating dimming system and LED driver compatibility.

**PART 3 - EXECUTION****3.01 INSTALLATION**

- A. Install lamps in luminaires and lampholders.
- B. Fixture Support:
  - 1. Light fixtures mounted in or on suspended ceilings shall be positively attached to the suspended ceiling system.
  - 2. Support surface-mounted and pendant-mounted luminaires directly from building structure and attach to main runners of ceiling grid T structure.
  - 3. If structure is inaccessible in existing plasterboard ceiling installations, use toggle bolts at each fixture end.
  - 4. Fasten to T grid system using bolts, screws, rivets, or approved ceiling framing member clips.
  - 5. Support all pendant fixtures independently of outlet box from roof, floor, or ceiling structure above. Use approved hanger, lag screws, lag bolts, toggle bolts, or cinch anchors to support fixture plus 100 lbs at each support.
  - 6. Provide two #12 gauge steel wire seismic supports connected to structure for light fixtures less than 50 lbs. Seismic supports may be installed slack.
  - 7. Coordinate with other trades for additional framing or support, if required to properly install recessed, surface, and pendant mounted fixture in various ceiling suspension systems.

**3.02 ADJUSTING AND CLEANING**

- A. Clean lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Touch up luminaire finish at completion of work.

**3.04 PREPARATION**

- A. Field Measurements:
  - 1. Coordinate lighting fixture location in mechanical spaces with mechanical equipment. Report adverse conditions to Architect.
  - 2. Do not install any work until any discrepancies discovered have been resolved.
- B. Preparation of Surfaces:
  - 1. Clean field painted lighting fixture, prior to application of paint.
- C. Noisy Ballasts:
  - 1. Architect shall determine which ballasts are excessively noisy and to be replaced at no cost to owner.
  - 2. Check: Ballasts shall be tightly fastened to fixture and have no loose connections.

**END OF SECTION**



## COMMUNICATION RACEWAY SYSTEM

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Structured wiring system raceway and outlet installation.
- B. Audio Visual System raceway system.

#### 1.02 RELATED SECTIONS

- A. Section 26 05 30 - Conduit.
- B. Section 26 05 32 - Outlet, Pull and Junction Boxes
- C. Section 26 05 29 - Supporting Devices.
- D. Section 26 05 53 - Identification.
- E. Section 26 05 31 – Surface Raceway

#### 1.03 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 260100.
- B. Accurately record location of outlets, and routing of conduits.

### PART 2 - PRODUCTS

#### 2.01 RACEWAYS

- A. Per sections 26 05 31 and 26 05 30.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Verify that surfaces are ready to receive work and field dimensions match drawings.
- B. Do not start work until conditions are acceptable.

#### 3.02 INSTALLATION

- A. Coordinate network raceway installation with U of O Network Services.
- B. Coordinate A/V system wiring with U of O Audio / Visual Department.
- C. Support raceways, outlets, and equipment under the provisions of Section 26 05 29.
- D. Reroute existing network wiring as noted on drawings.
- E. Rough in for telephone and computer outlets at locations indicated on Drawings.
- F. Install conduit stubbed from each telephone, network, speaker, and TV outlet into accessible attic space where noted on Drawings.
- G. Install 2 gang mudring at new network faceplate location with conduit run to mudring location.

- H. Install junction box at speaker locations. Install flush in wall in stud walls. Install wiremold box on concrete walls.
- I. Install pull wire in each empty conduit.
- J. Mark all junction boxes with the appropriate legend.
- K. Size conduit per schedule below:

COMMUNICATION CONDUIT SIZE SCHEDULE	
Number of Communication Outlets Served by Conduit	Conduit Size
1	3/4"
2	1"
4	1-1/4"
6	1-1/2"
10	2"

**END OF SECTION**

## **FIRE ALARM SYSTEM**

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. The Contractor shall furnish and install fire alarm devices, as specified herein and indicated on the drawings.
- B. The system shall include initiating devices, a wiring system and all accessories required to provide a complete operating system.
- C. All components shall be compatible with the existing system.

#### **1.02 SUBMITTALS**

- A. Submit complete and descriptive shop drawings in accordance with Section 26 01 00.
- B. Submit plans and specifications to the local fire marshal. Obtain his written acceptance of the system prior to beginning work and ordering equipment.

#### **1.03 OPERATION AND MAINTENANCE DATA**

- A. Submit data under provisions of Section 26 01 00.
- B. Include manufacturer representative's letter stating that system is operational.

#### **1.04 REFERENCES**

- A. NFPA 72 - National Fire Alarm Code.
- B. NFPA 101 - Life Safety Code.
- C. IBC – International Building Code.

### **PART 2 PRODUCTS**

#### **2.01 ACCEPTABLE MANUFACTURER REPRESENTATIVE**

- A. Integrated Electronic Systems

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install system in accordance with manufacturer's instructions.
- B. Wire:
  - 1. Furnish and install all required wiring in accordance with Local and National Codes and Article 210 of the National Board of Fire Underwriter's Standard Number 72.
  - 2. 14 AWG minimum size conductors for fire alarm detection and signal circuit conductors or as per manufacturer's recommendations and as per NEC.
  - 3. All wiring shall be in conduit. Conduit shall be sized by the Contractor.
- C. The Contractor shall test all conductors for ground before making final wiring connections. This shall be done with a megger insulation tester or equal.

- D. All "J" boxes for fire alarm system shall be painted red and labeled in white letters, minimum 1/4" "fire alarm".
- E. Refer to mechanical drawings for quantity, location and type of device to be connected to the fire alarm system.

**3.02 FIELD QUALITY CONTROL**

- A. Field testing will be performed under provisions of Section 26 01 00.
- B. Test in accordance with NFPA 72H and local fire department requirements.

**3.03 MANUFACTURER'S FIELD SERVICES**

- A. Provide manufacturer's field services under provisions of Section 26 01 00.
- B. Include services of factory trained representative to supervise installation, adjustments, final connections, and system testing.

**3.04 INSPECTION AND TESTS UPON COMPLETION OF SYSTEM**

- A. Check out and final connections to the fire alarm control panel shall be made by factory trained technicians in the employ of a factory authorized franchised dealer for the products installed. In addition, factory trained technicians shall demonstrate operation of the complete system and each major component to the Owner.
- B. The system, upon completion of installation by the Electrical Contractor, shall be checked out and all connections to initiating and indicating devices shall be supervised by factory trained technicians in the employ of a factory franchised dealer for the product installed. Each individual device shall be checked out and tested for operation by a factory trained technician.
- C. System field wiring diagrams shall be provided to the Electrical Contractor by the system manufacturer prior to installation.
- D. Tests by the Electrical Contractor shall include tests for grounds and short circuits, continuity tests of exterior circuit. Performance of controls and all initiating and indicating devices shall be made by the factory trained technicians in the employ of a factory authorized franchised dealer for the product installed.
- E. The report covering these tests and inspection will be submitted direct to the Architect in triplicate.
- F. The system, upon completion of installation by the Electrical Contractor, shall be tested. All initiating and control functions shall be tested for operation.

**3.05 WARRANTY**

- A. The Contractor shall warrant the completed Fire Alarm System wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

**END OF SECTION**



# ARCHITECTURE & ALLIED ARTS REMODEL UNIVERSITY OF OREGON

EUGENE, OREGON

## PROJECT ATTACHMENTS

### STRUCTURAL ENGINEERING:

- STRUCTURAL CALCULATIONS

### MECHANICAL ENGINEERING:

- VENTILATION CALCULATIONS

### ENERGY COMPLIANCE:

- COM-CHECK MECHANICAL ENERGY COMPLIANCE CERTIFICATE
- COM-CHECK INTERIOR LIGHTING ENERGY COMPLIANCE CERTIFICATE

**JUNE 3<sup>rd</sup>, 2014**



**NIR PEARLSON**  
ARCHITECT, INC.



# STRUCTURAL CALCULATIONS



Nir Pearlson Architect, Inc.  
1460 East 21<sup>st</sup> Avenue  
Eugene, Oregon, 97403

Re: Lawrence Hall Tenant Infill  
University of Oregon, Eugene, Oregon

Nir,


Per your request, Johnson Broderick Engineering has reviewed the drawings you have prepared for the tenant infill project you are designing for the School of Architecture and Allied Arts at Lawrence Hall on the campus of the University of Oregon. Our review is based on several site visits with you and drawings prepared by your office, dated May 27, 2014.

The scope of the project includes the removal of walls, installation of new support beams, addition of rooftop HVAC units, reconfiguration of an existing ramp for ADA access, and other minor alterations. The scope of our review is limited to the evaluation of new gravity members for adequacy; there is no impact to the existing lateral system and modifications to it are beyond the scope of our work.

We analyzed critical elements utilizing the provisions set forth in the current building code, the 2010 Oregon Structural Specialty Code (the 2009 International Building Code as amended by the State of Oregon). We utilized a dead load of 20 psf, a roof snow load of 25 psf and a floor live load of 80 psf for corridors above the first floor in educational facilities, as well as an allowable soil bearing pressure of 1500 psf.

We have marked up your drawings with the fasteners, dimensions, members, and assemblies as required by our calculations. We appreciate the opportunity to be of service. Please call if you have any comments or questions.

Sincerely,

5-27-14  


Aaron M. Broderick, P.E.  
Principal, Johnson Broderick Engineering, LLC

EXPIRES: 12/15

check ladder framing @ ramp:

$l = 7'$

$w_D = 16 \frac{1}{12} (20) = 27 \text{ pif}$

$w_L = 16 \frac{1}{12} (80) = 107 \text{ pif}$  or 1k point load @ midspan

2x8  
@ 16"  
O.C.  
OK

check stringers @ ramp

$l = 16'$

$w_D = 4(20) = 80 \text{ pif}$

$w_L = 4(80) = 320 \text{ pif}$  or 1k PL @ midspan

(2) 13/4" x 11 7/8"  
1.9E LVL OK

size single span beam @ transom:

$l = 20'$  (12' other span)

$w_D = 14(20) = 280 \text{ pif}$

$w_L = 14(25) = 350 \text{ pif}$

PL @ 0, 4, 8, 12, 16, 20:

DL:  $\frac{1}{2}(18)(4)(20) = 720 \text{ lb}$

LL:  $\frac{1}{2}(18)(4)(25) = 900 \text{ lb}$

6 3/4" x 18" 24F-V4 GLB OK

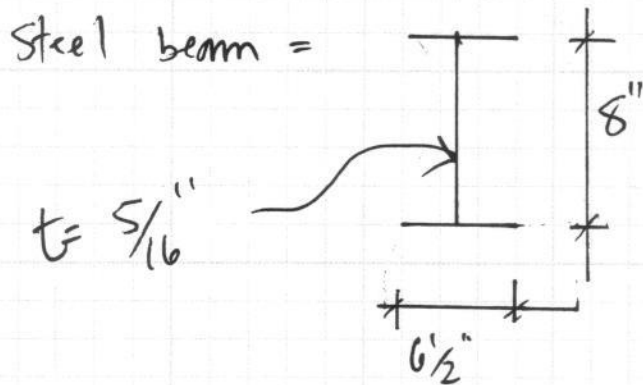
size post @ center:

DL = 5800 + 3640 lb = 9440 lb

LL = 5700 + 3540 = 9240 lb

HSS 6 x 4 x 5/16" OK

check bearing on existing steel beam:



$l = 12', 20'$

$W_D = 13(15) = 260 \text{ plf}$

$W_L = 13(80) = 1140 \text{ plf}$

PL @ 15' on 20' span:

DL: 3640 lb

LL: 3540 lb

check bearing on existing steel post

$h = 20'$

$PL_D = 5800 \text{ lb}$

$PL_L = 5700 \text{ lb}$

} existing 6"  $\phi$  pipe OK

Project: Lamronce Hall T1

Project #: 14027.02

By: AMB

Date: 5-27-14

Page: 2 of 17

Size support beam @ steel beam existing:

$$l = 20'$$

$$W_D = 13(15) = 260 \text{ plf}$$

$$W_L = 13(86) = 1140 \text{ plf} \Rightarrow \text{LL reduction: } K_{LL} = 4$$

$$A_T = 280 \text{ ft}^2$$

$$K_{LL} A_T = 1120 \text{ ft}^2$$

$$L = 1140 \text{ plf} \left[ 0.25 + \frac{15}{(1120)^{1/2}} \right] = 796 \text{ plf}$$

$\Rightarrow 6\frac{3}{4}" \times 18"$  GLB OK

$$R_{xn}: 16008 \text{ lb}$$

$$\Rightarrow \frac{16008 \text{ lb}}{3680 \text{ lb}/\frac{5}{8}" \text{ bolt}}$$

$$= 4.35 \Rightarrow 5 \text{ bolts min.}$$

(@ existing column)

Project: Lawrence Hall T1

Project #: 14227.01

By: AMB

Date: 5-27-14

Page: 3 of 17



Project: 14027.20 - calcs

Location: Floor Joist 1

Floor Joist

[2009 International Building Code(2005 NDS)]

1.5 IN x 13.0 IN x 25.0 FT @ 16 O.C.

Select Structural - Douglas-Fir-Larch - Dry Use

Section Inadequate By: 7.8%

Controlling Factor: Deflection / Depth Required 13.33 In.

DEFLECTIONS		Center
Live Load	0.56	IN L/534
Dead Load	0.34	in
Total Load	0.90	IN L/334
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

REACTIONS		A	B
Live Load	417	lb	417
Dead Load	250	lb	250
Total Load	667	lb	667
Bearing Length	0.71	in	0.71

BEAM DATA		Center
Span Length	25	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Floor sheathing applied to top of joists-top of joists fully braced.		
Floor Duration Factor	1.15	

**MATERIAL PROPERTIES**  
Select Structural - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 1500 psi	Fb' = 1785 psi
	Cd=1.15 CF=0.90 Cr=1.15	
Shear Stress:	Fv = 180 psi	Fv' = 207 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Min. Mod. of Elasticity:	E_min = 690 ksi	E_min' = 690 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 4167 ft-lb  
12.5 Ft from left support of span 2 (Center Span)  
Created by combining all dead loads and live loads on span(s) 2

**Controlling Shear:** 667 lb  
At left support of span 2 (Center Span)  
Created by combining all dead loads and live loads on span(s) 2

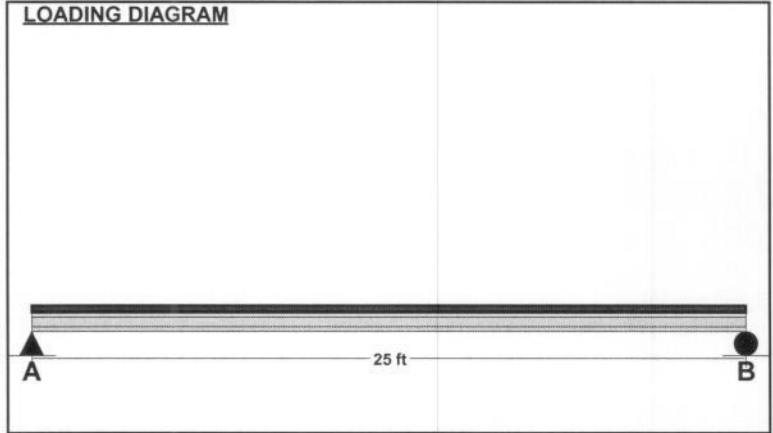
Comparisons with required sections:	Req'd	Provided
Section Modulus:	28.01 in <sup>3</sup>	42.25 in <sup>3</sup>
Area (Shear):	4.83 in <sup>2</sup>	19.5 in <sup>2</sup>
Moment of Inertia (deflection):	296.01 in <sup>4</sup>	274.63 in <sup>4</sup>
Moment:	4167 ft-lb	6286 ft-lb
Shear:	667 lb	2691 lb



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:10 PM



**JOIST LOADING**

Uniform Floor Loading	Center
Live Load	LL = 25 psf
Dead Load	DL = 15 psf
Total Load	TL = 40 psf
TL Adj. For Joist Spacing wT =	53.3 plf

Project: 14027.20 - calcs

Location: Existing roof joists

Floor Joist

[2009 International Building Code(2005 NDS)]

1.5 IN x 13.25 IN x 25.0 FT @ 16 O.C.

Select Structural - Douglas-Fir-Larch - Dry Use

Section Inadequate By: 1.8%

Controlling Factor: Deflection / Depth Required 13.33 In.

<b>DEFLECTIONS</b>		Center
Live Load	0.53	IN L/566
Dead Load	0.32	in
Total Load	0.85	IN L/354
Live Load Deflection Criteria: L/480		Total Load Deflection Criteria: L/360

<b>REACTIONS</b>		A	B
Live Load	417	lb	417
Dead Load	250	lb	250
Total Load	667	lb	667
Bearing Length	0.71	in	0.71

<b>BEAM DATA</b>		Center
Span Length	25	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Floor sheathing applied to top of joists-top of joists fully braced.		
Floor Duration Factor	1.15	

**MATERIAL PROPERTIES**

Select Structural - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 1500 psi Cd=1.15 CF=0.90 Cr=1.15	Fb' = 1785 psi
Shear Stress:	Fv = 180 psi Cd=1.15	Fv' = 207 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Min. Mod. of Elasticity:	E_min = 690 ksi	E_min' = 690 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 4167 ft-lb  
 12.5 Ft from left support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 2

**Controlling Shear:** 667 lb  
 At left support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 2

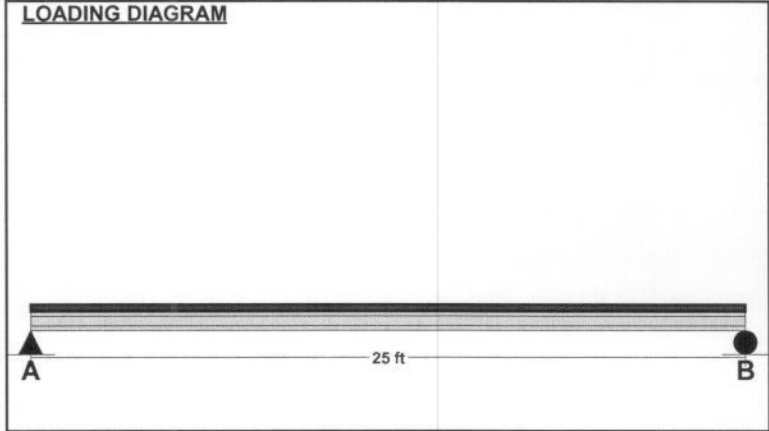
Comparisons with required sections:	Req'd	Provided
Section Modulus:	28.01 in3	43.89 in3
Area (Shear):	4.83 in2	19.88 in2
Moment of Inertia (deflection):	296.01 in4	290.78 in4
Moment:	4167 ft-lb	6530 ft-lb
Shear:	667 lb	2743 lb



Aaron  
 Johnson Broderick Engineering, LLC  
 325 West 13th Avenue  
 Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:10 PM



**JOIST LOADING**

Uniform Floor Loading	Center
Live Load	LL = 25 psf
Dead Load	DL = 15 psf
Total Load	TL = 40 psf
TL Adj. For Joist Spacing wT =	53.3 plf

Project: 14027.20 - calcs

Location: Check pipe column at center bearing  
Column

[2009 International Building Code(AISC 13th Ed ASD)]

Pipe 3 Std. x 10.0 FT /ASTM A53-GR.B

Section Adequate By: 4.7%



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:10 PM

**VERTICAL REACTIONS**

Live Load: Vert-LL-Rxn = 13091 lb  
Dead Load: Vert-DL-Rxn = 11161 lb  
Total Load: Vert-TL-Rxn = 24252 lb

**COLUMN DATA**

Total Column Length: 10 ft  
Unbraced Length (X-Axis) Lx: 10 ft  
Unbraced Length (Y-Axis) Ly: 10 ft  
Column End Condition-K (e): 1

**COLUMN PROPERTIES**

Pipe 3 Std. - Round

Steel Yield Strength:  $F_y = 35$  ksi  
Modulus of Elasticity:  $E = 29$  ksi  
Column Section:  $d_x = 3.5$  in  $d_y = 3.5$  in  
Column Wall Thickness:  $t = 0.201$  in  
Area:  $A = 2.08$  in<sup>2</sup>  
Moment of Inertia (deflection):  $I_x = 2.85$  in<sup>4</sup>  $I_y = 2.85$  in<sup>4</sup>  
Section Modulus:  $S_x = 1.63$  in<sup>3</sup>  $S_y = 1.63$  in<sup>3</sup>  
Plastic Section Modulus:  $Z_x = 2.19$  in<sup>3</sup>  $Z_y = 0$  in<sup>3</sup>  
Rad. of Gyration:  $r_x = 1.17$  in  $r_y = 1.17$  in

**Column Compression Calculations:**

KL/r Ratio:  $KL_x/r_x = 102.56$   $KL_y/r_y = 102.56$

Controlling Direction for Compr. Calcs: (Y-Y Axis)

Flexural Buckling Stress:  $F_{cr} = 20.43$  ksi

Controlling Equation: F8-1

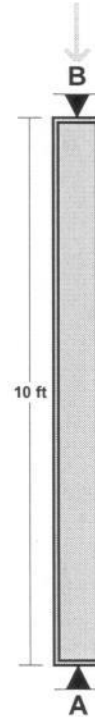
Nominal Compressive Strength:  $P_c = 25$  kip

**Combined Stress Calculations:**

H1-1a Controls : 0.95

**Controlling Combined Stress Factor: 0.95**

**LOADING DIAGRAM**



**AXIAL LOADING**

Live Load: PL = 13091 lb  
Dead Load: PD = 11085 lb  
Column Self Weight: CSW = 76 lb  
Total Load: PT = 24252 lb

Project: 14027.20 - calcs

Location: Ladder framing at ramp

Floor Joist

[2009 International Building Code(2005 NDS)]

1.5 IN x 7.25 IN x 7.0 FT @ 16 O.C.

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 66.5%

Controlling Factor: Moment

DEFLECTIONS		Center
Live Load	0.08	IN L/1111
Dead Load	0.02	in
Total Load	0.09	IN L/889
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

REACTIONS		A	B
Live Load	373	lb	373
Dead Load	93	lb	93
Total Load	467	lb	467
Bearing Length	0.50	in	0.50

BEAM DATA		Center
Span Length	7	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Floor sheathing applied to top of joists-top of joists fully braced.		
Floor Duration Factor	1.00	

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1242 psi
	Cd=1.00 CF=1.20 Cr=1.15	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc ⊥ = 625 psi	Fc ⊥' = 625 psi

**Controlling Moment:** 817 ft-lb  
 3.5 Ft from left support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 2

**Controlling Shear:** -467 lb  
 At right support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 2

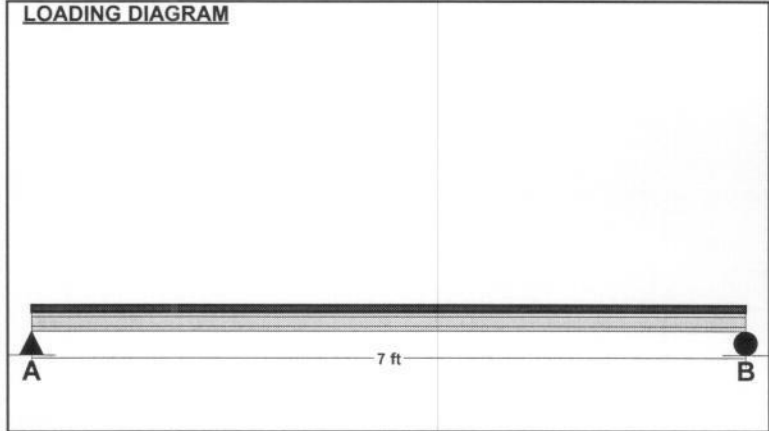
Comparisons with required sections:	Req'd	Provided
Section Modulus:	7.89 in3	13.14 in3
Area (Shear):	3.89 in2	10.88 in2
Moment of Inertia (deflection):	20.58 in4	47.63 in4
Moment:	817 ft-lb	1360 ft-lb
Shear:	-467 lb	1305 lb



Aaron  
 Johnson Broderick Engineering, LLC  
 325 West 13th Avenue  
 Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:10 PM



JOIST LOADING		Center
Uniform Floor Loading		
Live Load	LL =	80 psf
Dead Load	DL =	20 psf
Total Load	TL =	100 psf
TL Adj. For Joist Spacing	wT =	133.3 plf

Project: 14027.20 - calcs

Location: Ladder framing at ramp - point live load  
Multi-Loaded Multi-Span Beam  
[2009 International Building Code(2005 NDS)]  
1.5 IN x 7.25 IN x 7.0 FT  
#2 - Douglas-Fir-Larch - Dry Use  
Section Adequate By: 483.7%  
Controlling Factor: Moment



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM

DEFLECTIONS		Center
Live Load	0.00	IN L/Infinity
Dead Load	0.02	in
Total Load	0.02	IN L/4037
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

REACTIONS		A	B
Live Load	1000 lb	0 lb	
Dead Load	106 lb	103 lb	
Total Load	1106 lb	103 lb	
Bearing Length	1.18 in	0.11 in	

BEAM DATA		Center
Span Length	7 ft	
Unbraced Length-Top	2 ft	
Unbraced Length-Bottom	7 ft	
Live Load Duration Factor	1.00	
Notch Depth	0.00	

**MATERIAL PROPERTIES**

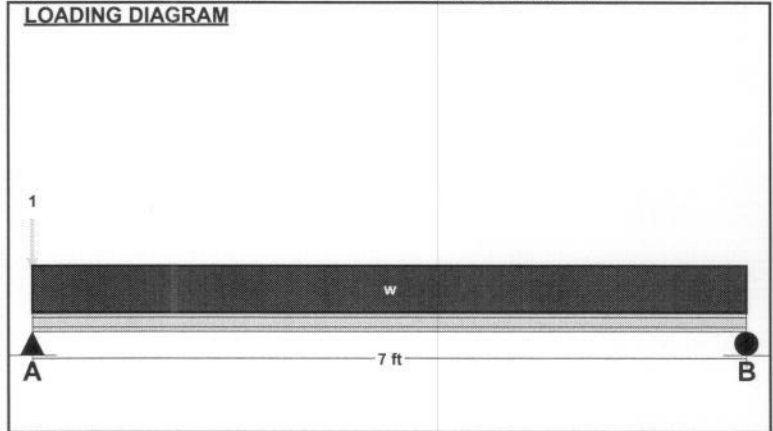
#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi Cd=0.90 Ci=0.99 CF=1.20	Fb' = 959 psi
Shear Stress:	Fv = 180 psi Cd=0.90	Fv' = 162 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 180 ft-lb  
3.5 Ft from left support of span 2 (Center Span)  
Created by dead loads only on all span(s).

**Controlling Shear:** 103 lb  
At left support of span 2 (Center Span)  
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	2.25 in3	13.14 in3
Area (Shear):	0.95 in2	10.88 in2
Moment of Inertia (deflection):	2.83 in4	47.63 in4
Moment:	180 ft-lb	1050 ft-lb
Shear:	103 lb	1175 lb



UNIFORM LOADS		Center
Uniform Live Load	0	plf
Uniform Dead Load	27	plf
Beam Self Weight	2	plf
Total Uniform Load	29	plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	1000 lb
Dead Load	3.5 lb
Location	0 ft

Project: 14027.20 - calcs

Location: Multi-Loaded Multi-Span Beam 6  
Multi-Loaded Multi-Span Beam  
[2009 International Building Code(2005 NDS)]  
( 2 ) 3.5 IN x 11.25 IN x 2.0 FT

#2 - Douglas-Fir-Larch - Dry Use

Section Inadequate By: 28.2%

Controlling Factor: Shear / Depth Required 14.43 In.

DEFLECTIONS		Center
Live Load	0.00	IN L/8454
Dead Load	0.00	in
Total Load	0.01	IN L/4573
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

REACTIONS		A	B
Live Load	6550 lb	6550 lb	
Dead Load	5567 lb	5567 lb	
Total Load	12117 lb	12117 lb	
Bearing Length	2.77 in	2.77 in	

BEAM DATA		Center
Span Length	2 ft	
Unbraced Length-Top	2 ft	
Unbraced Length-Bottom	2 ft	
Live Load Duration Factor	1.00	
Notch Depth	0.00	

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi Cd=1.00 Cl=1.00 CF=1.10	Fb' = 989 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc-⊥ = 625 psi	Fc-⊥' = 625 psi

**Controlling Moment:** 12109 ft-lb  
1.0 Ft from left support of span 2 (Center Span)  
Created by combining all dead loads and live loads on span(s) 2

**Controlling Shear:** -12117 lb  
At right support of span 2 (Center Span)  
Created by combining all dead loads and live loads on span(s) 2

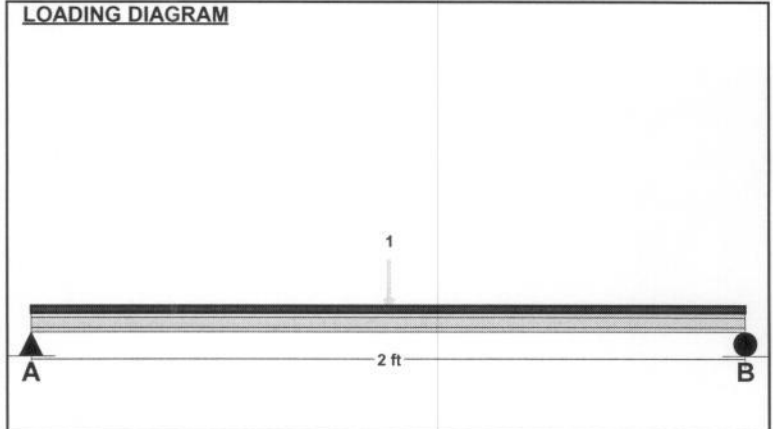
Comparisons with required sections:	Req'd	Provided
Section Modulus:	146.89 in3	147.66 in3
Area (Shear):	100.98 in2	78.75 in2
Moment of Inertia (deflection):	43.59 in4	830.57 in4
Moment:	12109 ft-lb	12172 ft-lb
Shear:	-12117 lb	9450 lb



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM



UNIFORM LOADS		Center
Uniform Live Load	0	plf
Uniform Dead Load	0	plf
Beam Self Weight	17	plf
Total Uniform Load	17	plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	13100 lb
Dead Load	11100 lb
Location	1 ft

Project: 14027.20 - calcs

Location: Stringers at ramp  
Multi-Loaded Multi-Span Beam  
[2009 International Building Code(2005 NDS)]  
( 2 ) 5.5 IN x 7.5 IN x 16.0 FT  
1.9E Microllam - iLevel Trus Joist  
Section Adequate By: 4.9%  
Controlling Factor: Deflection



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM

**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS**

Center

Live Load 0.51 IN L/378  
Dead Load 0.15 in  
Total Load 0.66 IN L/293  
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

A B

Live Load 2560 lb 2560 lb  
Dead Load 744 lb 744 lb  
Total Load 3304 lb 3304 lb  
Bearing Length 1.26 in 1.26 in

**BEAM DATA**

Center

Span Length 16 ft  
Unbraced Length-Top 2 ft  
Unbraced Length-Bottom 16 ft  
Live Load Duration Factor 1.00  
Notch Depth 0.00

**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

Base Values Adjusted

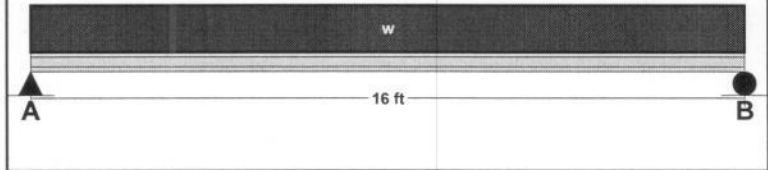
Bending Stress: Fb = 2600 psi Fb' = 2588 psi  
Cd=1.00 Cl=0.99 CF=1.00  
Shear Stress: Fv = 285 psi Fv' = 285 psi  
Cd=1.00  
Modulus of Elasticity: E = 1900 ksi E' = 1900 ksi  
Comp.  $\perp$  to Grain: Fc -  $\perp$  = 750 psi Fc -  $\perp$ ' = 750 psi

**Controlling Moment:** 13216 ft-lb  
8.0 Ft from left support of span 2 (Center Span)  
Created by combining all dead loads and live loads on span(s) 2  
**Controlling Shear:** -3304 lb  
At right support of span 2 (Center Span)  
Created by combining all dead loads and live loads on span(s) 2

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	61.27 in3	82.26 in3
Area (Shear):	17.39 in2	41.56 in2
Moment of Inertia (deflection):	465.58 in4	488.41 in4
Moment:	13216 ft-lb	17742 ft-lb
Shear:	-3304 lb	7897 lb

**LOADING DIAGRAM**



**UNIFORM LOADS**

Center

Uniform Live Load 320 plf  
Uniform Dead Load 80 plf  
Beam Self Weight 13 plf  
Total Uniform Load 413 plf

Project: 14027.20 - calcs

Location: Stringers at ramp - point live load  
Multi-Loaded Multi-Span Beam  
[2009 International Building Code(2005 NDS)]  
( 2 ) 1.75 IN x 11.875 IN x 16.0 FT  
1.9E Microllam - iLevel Trus Joist  
Section Adequate By: 154.3%  
Controlling Factor: Moment



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

page  
11  
of  
17

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM

**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS**

Center

Live Load 0.16 IN L/1208

Dead Load 0.15 in

Total Load 0.31 IN L/626

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

A

B

Live Load 500 lb 500 lb

Dead Load 744 lb 744 lb

Total Load 1244 lb 1244 lb

Bearing Length 0.47 in 0.47 in

**BEAM DATA**

Center

Span Length 16 ft

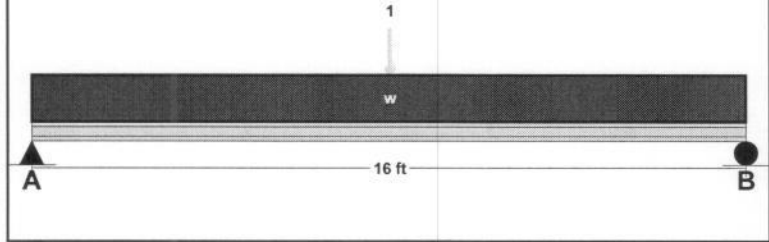
Unbraced Length-Top 2 ft

Unbraced Length-Bottom 16 ft

Live Load Duration Factor 1.00

Notch Depth 0.00

**LOADING DIAGRAM**



**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

Base Values

Adjusted

Bending Stress: Fb = 2600 psi Fb' = 2588 psi

Cd=1.00 Cl=0.99 CF=1.00

Shear Stress: Fv = 285 psi Fv' = 285 psi

Cd=1.00

Modulus of Elasticity: E = 1900 ksi E' = 1900 ksi

Comp.  $\perp$  to Grain: Fc  $\perp$  = 750 psi Fc  $\perp$ ' = 750 psi

**UNIFORM LOADS**

Center

Uniform Live Load 0 plf

Uniform Dead Load 80 plf

Beam Self Weight 13 plf

Total Uniform Load 93 plf

**POINT LOADS - CENTER SPAN**

Load Number One

Live Load 1000 lb

Dead Load 0 lb

Location 8 ft

Controlling Moment: 6976 ft-lb

8.0 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -1244 lb

At right support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

Req'd

Provided

Section Modulus: 32.34 in3 82.26 in3

Area (Shear): 6.55 in2 41.56 in2

Moment of Inertia (deflection): 187.19 in4 488.41 in4

Moment: 6976 ft-lb 17742 ft-lb

Shear: -1244 lb 7897 lb



Project: 14027.20 - calcs

Location: Footing at center post

Footing

[2009 International Building Code(2005 NDS)]

Footing Size: 4.25 FT x 4.5 FT x 16.00 IN

Reinforcement in Long Direction: #4 Bars @ 6.00 IN. O.C. / (8) min.

Reinforcement in Short Direction-center band (Equal to width of short side): #4 Bars @ 6.00 IN. O.C. / (8) min.

Reinforcement in Short Direction-outside bands: #4 Bars @ 0.00 IN. O.C. / ( ) Each band.

Section Footing Design Adequate



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

page  
12  
of  
17

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM

**FOOTING PROPERTIES**

Allowable Soil Bearing Pressure: Qs = 1500 psf  
Concrete Compressive Strength: F'c = 2500 psi  
Reinforcing Steel Yield Strength: Fy = 60000 psi  
Concrete Reinforcement Cover: c = 3 in

**FOOTING SIZE**

Width: W = 4.25 ft  
Length: L = 4.5 ft  
Depth: Depth = 16 in  
Effective Depth to Top Layer of Steel: d = 12.25 in

**COLUMN AND BASEPLATE SIZE**

Column Type: Concrete  
Column Width: m = 4 in  
Column Depth: n = 6 in

**FOOTING CALCULATIONS**

**Bearing Calculations:**

Ultimate Bearing Pressure: Qu = 1265 psf  
Effective Allowable Soil Bearing Pressure: Qe = 1300 psf  
Required Footing Area: Areq = 18.62 sf  
Area Provided: A = 19.13 sf

**Baseplate Bearing:**

Bearing Required: Bear = 34280 lb  
Allowable Bearing: Bear-A = 66300 lb

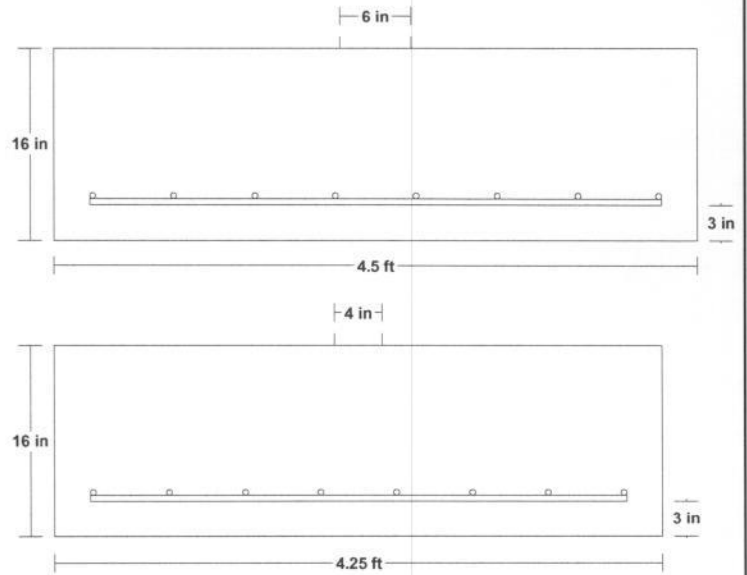
**Beam Shear Calculations (One Way Shear):**

Beam Shear: Vu1 = 7459 lb  
Allowable Beam Shear: Vc1 = 46856 lb

**Punching Shear Calculations (Two Way Shear):**

Critical Perimeter: Bo = 69 in  
Punching Shear: Vu2 = 30589 lb  
Allowable Punching Shear (ACI 11-35): vc2-a = 147919 lb  
Allowable Punching Shear (ACI 11-36): vc2-b = 288488 lb  
Allowable Punching Shear (ACI 11-37): vc2-c = 126788 lb  
Controlling Allowable Punching Shear: vc2 = 126788 lb

**LOADING DIAGRAM**



**FOOTING LOADING**

Live Load: PL = 13100 lb  
Dead Load: PD = 11100 lb  
Total Load: PT = 24200 lb  
Ultimate Factored Load: Pu = 34280 lb  
Weight to resist uplift w/ 1.5 F.S.: U.R. = 2465 lb

Short Direction:

**Bending Calculations:**

Factored Moment: Mu = 185599 in-lb  
Nominal Moment Strength: Mn = 1003756 in-lb

**Reinforcement Calculations:**

Concrete Compressive Block Depth: a = 0.82 in  
Steel Required Based on Moment: As(1) = 0.28 in<sup>2</sup>  
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4): As(2) = 1.56 in<sup>2</sup>  
Controlling Reinforcing Steel: As-reqd = 1.56 in<sup>2</sup>  
Selected Reinforcement: Short Dir: #4's @ 6.0 in. o.c.(8) Min.  
Reinforcement Area Provided: As = 1.57 in<sup>2</sup>

**Development Length Calculations:**

Development Length Required: Ld = 15 in  
Development Length Supplied: Ld-sup = 20.5 in

Long Direction:

**Bending Calculations:**

Factored Moment: Mu = 182827 in-lb  
Nominal Moment Strength: Mn = 1002199 in-lb

**Reinforcement Calculations:**

Concrete Compressive Block Depth: a = 0.87 in  
Steel Required Based on Moment: As(1) = 0.28 in<sup>2</sup>  
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4): As(2) = 1.47 in<sup>2</sup>  
Controlling Reinforcing Steel: As-reqd = 1.47 in<sup>2</sup>  
Selected Reinforcement: Long Dir: #4's @ 6.0 in. o.c.(8) Min.  
Reinforcement Area Provided: As = 1.57 in<sup>2</sup>

**Development Length Calculations:**

Development Length Required: Ld = 15 in  
Development Length Supplied: Ld-sup = 21 in

Project: 14027.20 - calcs

Location: Beam at transom

Multi-Loaded Multi-Span Beam

[2009 International Building Code(2005 NDS)]

6.75 IN x 18.0 IN x 37.0 FT (17 + 20)

24F-V8 - Visually Graded Western Species - Dry Use

Section Adequate By: 76.7%

Controlling Factor: Moment

DEFLECTIONS	Center	Right
Live Load	0.13 IN L/1549	0.24 IN L/1020
Dead Load	0.05 in	0.14 in
Total Load	0.18 IN L/1154	0.38 IN L/636
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

REACTIONS	A	B	C
Live Load	3898 lb	13091 lb	5435 lb
Dead Load	2555 lb	11085 lb	4174 lb
Total Load	6454 lb	24177 lb	9609 lb
Bearing Length	1.47 in	5.51 in	2.19 in

BEAM DATA	Center	Right
Span Length	17 ft	20 ft
Unbraced Length-Top	2 ft	2 ft
Unbraced Length-Bottom	17 ft	20 ft
Live Load Duration Factor	1.15	
Notch Depth	0.00	

**MATERIAL PROPERTIES**

24F-V8 - Visually Graded Western Species

	Base Values	Adjusted
Bending Stress:	Fb = 2400 psi	Controlled by: Fb_cmp'r = 2400 psi
	Fb_cmp'r = 2400 psi	Fb_cmp'r' = 2664 psi
	Cd=1.15 Cl=0.97	
Shear Stress:	Fv = 265 psi	Fv' = 305 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi
Min. Mod. of Elasticity:	E_min = 930 ksi	E_min' = 930 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 650 psi	Fc $\perp$ ' = 650 psi

**Controlling Moment:** -45786 ft-lb  
Over left support of span 3 (Right Span)  
Created by combining all dead loads and live loads on span(s) 2, 3

**Controlling Shear:** 12093 lb  
At left support of span 3 (Right Span)  
Created by combining all dead loads and live loads on span(s) 2, 3

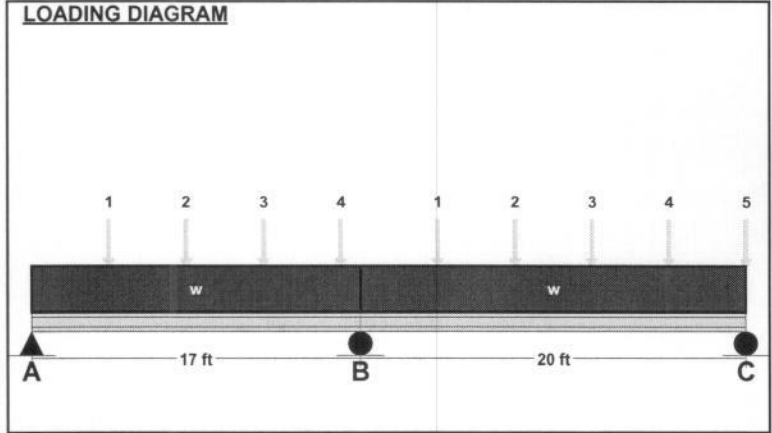
Comparisons with required sections:	Req'd	Provided
Section Modulus:	206.27 in3	364.5 in3
Area (Shear):	59.52 in2	121.5 in2
Moment of Inertia (deflection):	1237.91 in4	3280.5 in4
Moment:	-45786 ft-lb	80908 ft-lb
Shear:	12093 lb	24685 lb



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM



UNIFORM LOADS	Center	Right
Uniform Live Load	350 plf	350 plf
Uniform Dead Load	280 plf	280 plf
Beam Self Weight	26 plf	26 plf
Total Uniform Load	656 plf	656 plf

POINT LOADS - CENTER SPAN					
Load Number	One	Two	Three	Four	
Live Load	900 lb	900 lb	900 lb	900 lb	
Dead Load	720 lb	720 lb	720 lb	720 lb	
Location	4 ft	8 ft	12 ft	16 ft	
RIGHT SPAN					
Load Number	One	Two	Three	Four	Five
Live Load	900 lb	900 lb	900 lb	900 lb	900 lb
Dead Load	720 lb	720 lb	720 lb	720 lb	720 lb
Location	4 ft	8 ft	12 ft	16 ft	20 ft

Project: 14027.20 - calcs

Location: New 6 x 6 at beam ends

Column

[2009 International Building Code(2005 NDS)]

5.5 IN x 5.5 IN x 10.0 FT

#2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 26.1%



Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

page  
14  
of  
17

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM

**VERTICAL REACTIONS**

Live Load: Vert-LL-Rxn = 5800 lb  
Dead Load: Vert-DL-Rxn = 5766 lb  
Total Load: Vert-TL-Rxn = 11566 lb

**COLUMN DATA**

Total Column Length: 10 ft  
Unbraced Length (X-Axis) Lx: 10 ft  
Unbraced Length (Y-Axis) Ly: 10 ft  
Column End Condition-K (e): 1  
Axial Load Duration Factor 1.00

**COLUMN PROPERTIES**

#2 - Douglas-Fir-Larch

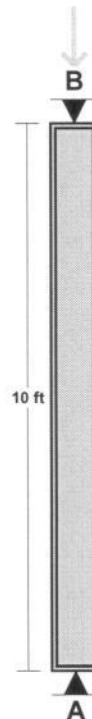
	<u>Base Values</u>	<u>Adjusted</u>
Compressive Stress:	Fc = 700 psi Cd=1.00 Cp=0.74	Fc' = 518 psi
Bending Stress (X-X Axis):	Fbx = 750 psi Cd=1.00 CF=1.00	Fbx' = 750 psi
Bending Stress (Y-Y Axis):	Fby = 750 psi Cd=1.00 CF=1.00	Fby' = 750 psi
Modulus of Elasticity:	E = 1300 ksi	E' = 1300 ksi
Min. Mod. of Elasticity:	E_min = 470 ksi	E_min' = 470 ksi
Column Section (X-X Axis):	dx = 5.5 in	
Column Section (Y-Y Axis):	dy = 5.5 in	
Area:	A = 30.25 in <sup>2</sup>	
Section Modulus (X-X Axis):	Sx = 27.73 in <sup>3</sup>	
Section Modulus (Y-Y Axis):	Sy = 27.73 in <sup>3</sup>	
Slenderness Ratio:	Lex/dx = 21.82 Ley/dy = 21.82	

**Column Calculations (Controlling Case Only):**

Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc = 382 psi
Allowable Compressive Stress:	Fc' = 518 psi
Eccentricity Moment (X-X Axis):	Mx-ex = 0 ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey = 0 ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx = 0 ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My = 0 ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx = 0 psi
Allowable Bending Stress (X-X Axis):	Fbx' = 750 psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby = 0 psi
Allowable Bending Stress (Y-Y Axis):	Fby' = 750 psi
<b>Combined Stress Factor:</b>	<b>CSF = 0.74</b>

**LOADING DIAGRAM**



**AXIAL LOADING**

Live Load: PL = 5800 lb  
Dead Load: PD = 5700 lb  
Column Self Weight: CSW = 66 lb  
Total Load: PT = 11566 lb

Project: 14027.20 - calcs

Location: Check existing steel beam for point load

Multi-Loaded Multi-Span Beam

[2009 International Building Code(AISC 13th Ed ASD)]

A36 W8x24 x 32.0 FT (12 + 20)

Section Adequate By: 14.4%

Controlling Factor: Moment

DEFLECTIONS	Left		Center	
Live Load	-0.04	IN L/3880	0.40	IN L/604
Dead Load	-0.02	in	0.18	in
Total Load	-0.05	IN L/2664	0.58	IN L/415
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240				

REACTIONS	A	B	C
Live Load	1360 lb	10112 lb	3888 lb
Dead Load	621 lb	4614 lb	1774 lb
Total Load	1981 lb	14726 lb	5662 lb
Bearing Length	0.79 in	0.79 in	0.79 in

BEAM DATA	Left	Center
Span Length	12 ft	20 ft
Unbraced Length-Top	2 ft	2 ft
Unbraced Length-Bottom	12 ft	20 ft

**STEEL PROPERTIES**

W8x24 - A36

**Properties:**

Yield Stress:	Fy =	36 ksi
Modulus of Elasticity:	E =	29000 ksi
Depth:	d =	7.93 in
Web Thickness:	tw =	0.25 in
Flange Width:	bf =	6.5 in
Flange Thickness:	tf =	0.4 in
Distance to Web Toe of Fillet:	k =	0.79 in
Moment of Inertia About X-X Axis:	Ix =	82.7 in <sup>4</sup>
Section Modulus About X-X Axis:	Sx =	20.9 in <sup>3</sup>
Plastic Section Modulus About X-X Axis:	Zx =	23.1 in <sup>3</sup>

**Design Properties per AISC 13th Edition Steel Manual:**

Flange Buckling Ratio:	FBR =	8.13
Allowable Flange Buckling Ratio:	AFBR =	10.79
Web Buckling Ratio:	WBR =	25.89
Allowable Web Buckling Ratio:	AWBR =	106.72
Controlling Unbraced Length:	Lb =	20 ft
Limiting Unbraced Length -		
for lateral-torsional buckling:	Lp =	6.7 ft
for Eqn. F2-2:	Lr =	24.9 ft
Nominal Flexural Strength w/ safety factor:	Mn =	30376 ft-lb
Controlling Equation:	F2-2	
Web height to thickness ratio:	h/tw =	25.89
Limiting height to thickness ratio for eqn. G2-2: h/tw-limit =		63.58
Cv Factor:	Cv =	1
Controlling Equation:	G2-2	
Nominal Shear Strength w/ safety factor:	Vn =	27977 lb

**Controlling Moment:** -26562 ft-lb

Over left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 1, 2

**Controlling Shear:** 8318 lb

At left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s)

**Comparisons with required sections:**

	Req'd	Provided
Moment of Inertia (deflection):	49.29 in <sup>4</sup>	82.7 in <sup>4</sup>
Moment:	-26562 ft-lb	30376 ft-lb
Shear:	8318 lb	27977 lb



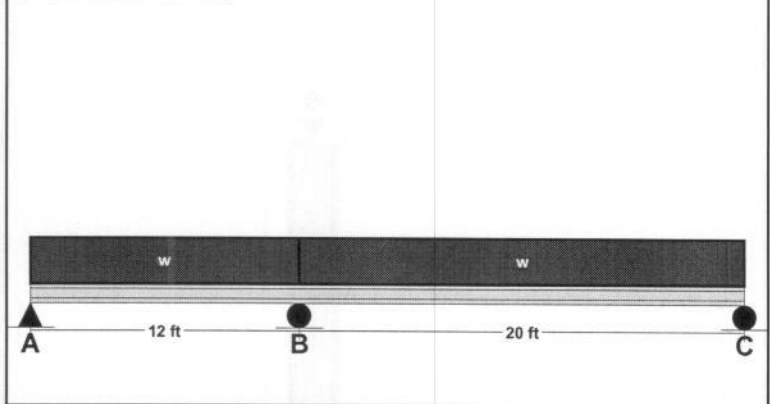
Aaron  
Johnson Broderick Engineering, LLC  
325 West 13th Avenue  
Eugene, Oregon, 97401

page  
15  
of  
17

StruCalc Version 8.0.113.0

5/28/2014 1:20:11 PM

**LOADING DIAGRAM**



UNIFORM LOADS	Left	Center
Uniform Live Load	480 plf	480 plf
Uniform Dead Load	195 plf	195 plf
Beam Self Weight	24 plf	24 plf
Total Uniform Load	699 plf	699 plf

# VENTILATION CALCULATIONS



Outside Air Quality:

Reference City	1987 Population	PM 10 AM (UGM)	SO2 AM (PPM)	SO2 24-Hour (PPM)	CO 8 hour (PPM)	NO2 AM (PPM)	Ozone 2nd DMX (PPM)	PB Qmax (UGM)
Eugene, OR	265,000	38	ND	ND	6	ND	0.08	0.02
Medford, OR	143,000	51	ND	ND	12	ND	0.09	0.04
Salem, OR	266,000	ND	ND	ND	4	ND	ND	ND
Portland, OR	1,168,000	33	0.007	0.023	10	IN	0.09	0.11
Acceptable NAAQS Limits		50	0.030	0.140	9	0.053	0.12	1.15

$$V_{bz} = R_p * P_z + R_a * A_z$$

Vbz = Breathing Zone Outdoor Airflow (cfm)  
 Az = Zone Floor Area (sq ft)  
 Pz = Zone Population (Table 6-1)  
 Rp = Outdoor Airflow Rate per Person (Table 6-1)  
 Ra = Outdoor Airflow Rate per Unit Area (Table 6-1)

$$V_{oz} = V_{bz} / E_z$$

Voz = Zone Outdoor Airflow (cfm)  
 Vbz = Breathing Zone Outdoor Airflow (cfm)  
 Ez = Zone Air Distribution Effectiveness  
 (Table 6-2)

$$Z_p = V_{oz} / V_{dz}$$

Zp = Zone Primary Outdoor Air Fraction  
 Voz = Zone Outside Airflow (cfm)  
 Vdz = Zone Minimum Primary Airflow (cfm)

- Notes:
1. Reference data from the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards Technical Support Division; National Air Quality and Emissions Trends Report, 1989.
  2. ND indicates that data is not available.
  3. IN indicates insufficient data to calculate summary statistic.
  4. NAAQS indicates National Ambient Air Quality Standards.

Overall Building Summary:

Occupancy:	1,317 cfm
Bldg Pressurization:	0 cfm
General Exhaust:	0 cfm
Process Tool Exh:	0 cfm
Total:	1,317 cfm

- Notes:
1. Total outside air based on the larger value for Occupancy or the total of Building Pressurization + Exhaust Air + Equipment Exhaust.
  2. Overall outside air is based on the following;  
Occupancy

Building Pressurization:

Building Area:	3,418 sf
Pressurization:	0.08 cfm/sf
Total:	256 cfm

Door Leakage:

Door Types:	Man Door	Roll-up
No of Doors:	0	0
Pressurization:	50	100 cfm/door
Total:	0 cfm	

/OA	1	2	3	4	5	6	7	8	9	10	11	12	Outside Air (cfm)	Percent OA (%)	Supply Air (cfm)	Remarks
AHU Serves	AHU Design	Area (sf)	Occupant Vent Air (cfm)	Exhaust Air (cfm)	Pressure 0.08 cfm/sf	Man Door 50 cfm/door	Roll-up 100 cfm/door	Door Leakage (cfm)	Design Pressure (cfm)	OA Basis (Vent/Exh)						
Classroom	HP-1	918	513	0	69	0	0	0	0	Ventilation			513	43%	1,200 *	
Classroom	HP-2	891	571	0	67	0	0	0	0	Ventilation			571	29%	2,000 *	
Administration	HP-3	1,609	233	0	121	0	0	0	0	Ventilation			233	12%	2,000 *	
*	0	0	0	0	0	0	0	0	0	Ventilation			0	0%	0 *	
*	0	0	0	0	0	0	0	0	0	Ventilation			0	0%	0 *	
Check Totals:		3,418	1,317	0	256	0	0	0	0				1,317	25%	5,200	

Ventilation / Exhaust Air Requirements:

Room No	Room Name	AHU Design	Az Area (sf)	Ps Program No of People	Default Occupancy Density (#/1,000 sf) (note 1)	Pz Default No of People	Rp People Outdoor Air Rate (cfm/P)	Ra Area Outdoor Air Rate (cfm/sf)	Vbz Breathing Zone Outdoor Air (cfm)	Ez Zone Air Distrib Effective	Voz Zone Outdoor Airflow (cfm)	Vpz Design Primary Airflow (cfm)	Vdz Design Min Airflow (cfm)	Zp Zone Primary Outdoor Air Fraction	No of Fixtures	Exhaust / Fixture (cfm/ea)	General Exhaust (cfm)	Process Tool Exhaust (cfm)	Total Exhaust (cfm)	Outside Air (cfm) (note 2)	Outside Air Heating (Btuh) (note 3)	Cooling (Btuh) (note 3)	Remarks
222	Classroom	HP-1	918	30	35	33	10	0.12	410	0.8	513	1,200	1,200	0.43	0	0	0	0	0	513	29,901	10,324 *	
230	Classroom	HP-2	891	35	35	32	10	0.12	457	0.8	571	2,000	2,000	0.29	0	0	0	0	0	571	33,309	11,502 *	
*	0	0	0	0	0	0	0	0.00	0	0.8	0	0	0	0.00	0	0	0	0	0	0	0	0	0 *
251	Hallway	HP-3	640	10	0	0	0	0.06	38	0.8	48	390	390	0.12	0	0	0	0	0	48	2,799	967 *	
254	Administration	HP-3	684	6	5	4	5	0.06	71	0.8	89	1,130	1,130	0.08	0	0	0	0	0	89	5,179	1,788 *	
256	Conference	HP-3	285	12	50	15	5	0.06	77	0.8	96	480	480	0.20	0	0	0	0	0	96	5,621	1,941 *	
*	0	0	0	0	0	0	0	0.00	0	0.8	0	0	0	0.00	0	0	0	0	0	0	0	0	0 *
*	0	0	0	0	0	0	0	0.00	0	0.8	0	0	0	0.00	0	0	0	0	0	0	0	0	0 *
*	0	0	0	0	0	0	0	0.00	0	0.8	0	0	0	0.00	0	0	0	0	0	0	0	0	0 *
*	0	0	0	0	0	0	0	0.00	0	0.8	0	0	0	0.00	0	0	0	0	0	0	0	0	0 *
*	0	0	0	0	0	0	0	0.00	0	0.8	0	0	0	0.00	0	0	0	0	0	0	0	0	0 *
*	0	0	0	0	0	0	0	0.00	0	0.8	0	0	0	0.00	0	0	0	0	0	0	0	0	0 *
Totals:			3,418	93		84			1,054		1,317	5,200	5,200				0	0	0	1,317	76,809	26,522	

AHU Serves	AHU Design	Az Area (sf)	Ps Program No of People	Pz Default No of People	D Occupant Diversity	Vbz Breathing Zone Outdoor Air (cfm)	Ez Zone Air Distrib Effective	Voz Zone Outdoor Airflow (cfm)	Vpz Design Primary Airflow (cfm)	Vdz Design Min Airflow (cfm)	Vou Uncorrected Outdoor Air (cfm)	Zp (max) Primary Outdoor Air Fraction	Ev System Ventilation Efficiency	Vot Design Outdoor Airflow (cfm)
Classroom	HP-1	918	30	33	0.91	410	0.8	513	1,200	1,200	373	0.00	1.00	373
Classroom	HP-2	891	35	32	1.09	457	0.8	571	2,000	2,000	500	0.00	1.00	500
Administration	HP-3	1,609	28	19	1.47	187	0.8	233	2,000	2,000	275	0.00	1.00	275
*	0	0	0	0	0.00	0	0.8	0	0	0	0	0	1.00	0
*	0	0	0	0	0.00	0	0.8	0	0	0	0	0	1.00	0
*	0	0	0	0	0.00	0	0.8	0	0	0	0	0	1.00	0
*	0	0	0	0	0.00	0	0.8	0	0	0	0	0	1.00	0
Check Totals:		3,418	93	84	1.11	1,054		1,317	5,200	5,200	1,148			

Notes: 1. Calculations are based on ASHRAE Standard 62.1-2004, Ventilation for Acceptable IAQ.  
 2. Overall outside air is based on the following:  
 Occupancy  
 3. Outside air heating and cooling loads are based on the following:  
 Outside Conditions      Inside Conditions  
 Summer:      92.0 deg F      Summer:      75.0 deg F  
                   31.57 btu/lb      Winter:      27.09 btu/lb  
 Winter:      18.0 deg F      Winter:      72.0 deg F

Occupant Diversity (D) = 1.11  
 Uncorrected Outdoor Air (Vou) = 1,167 cfm  
 $Vou = D * \sum (Vbz)$   
 Zp (max) = 0.43  
 System Ventilation Efficiency (Ev) = 0.70  
 Design Outdoor Air Intake Flow (Vot) = 1,666 cfm  
 $Vot = Vou / Ev$   
 Ev = System Ventilation Efficiency (Table 6-3)



COM-CHECK MECHANICAL ENERGY  
COMPLIANCE CERTIFICATE





# Mechanical Compliance Certificate

## 2010 Oregon Energy Efficiency Specialty Code

### Section 1: Project Information

Project Type: **Alteration**

Project Title : Lawrence Hall Remodel

Construction Site:

1190 Franklin, Lawrence Hall  
University of Oregon  
Eugene, OR 97403

Owner/Agent:

Glen Macdonald  
University of Oregon  
Eugene, OR 97403  
541-346-2281  
glenm@uoregon.edu

Designer/Contractor:

Larry Thornton  
Fresh Aire Engineering  
8245 NW Chaparral Drive  
Corvallis, OR 97330  
541-738-8704  
freshaire2002@earthlink.net

### Section 2: General Information

Building Location (for weather data):

**Eugene, Oregon**

Climate Zone:

**4c**

### Section 3: Mechanical Systems List

#### Quantity System Type & Description

- 1 HVAC System 1 (RTU-1) (Single Zone) : Single Package Heat Pump  
Heating Mode: Capacity = 38 kBtu/h,  
Proposed Efficiency = 7.70 HSPF, Required Efficiency = 7.70 HSPF  
Cooling Mode: Capacity = 36 kBtu/h,  
Proposed Efficiency = 13.00 SEER, Required Efficiency = 13.00 SEER  
Fan System: None
- 2 HVAC System 2 (RTU-2, 3) (Single Zone) : Single Package Heat Pump  
Heating Mode: Capacity = 58 kBtu/h,  
Proposed Efficiency = 7.70 HSPF, Required Efficiency = 7.70 HSPF  
Cooling Mode: Capacity = 57 kBtu/h, , Air Economizer  
Proposed Efficiency = 13.00 SEER, Required Efficiency = 13.00 SEER  
Fan System: None

### Section 4: Requirements Checklist

*In the following requirements, blank checkboxes identify requirements that the applicant has not acknowledged as being met. Checkmarks identify requirements that the applicant acknowledges are met or excepted from compliance. 'Plans reference page/section' identifies where in the plans/specs the requirement can be verified as being satisfied.*

#### **Requirements Specific To: HVAC System 1 (RTU-1) :**

- 1. Equipment meets minimum efficiency: Heat Pump: 7.70 HSPF 13.00 SEER
- 2. Energy recovery ventilation systems. Individual fan systems that have both a design supply air capacity of 5,000 cfm or greater and a minimum outside air supply of 70 percent or greater of the design supply air quantity have an energy recovery system.  
*Exception(s):*
  - Where energy recovery systems are prohibited by the International Mechanical Code.
  - Systems serving spaces that are not cooled and are heated to less than 60°F.
  - Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
  - Type 1 kitchen exhaust hoods.
  - Cooling systems in climates with a 1-percent cooling design wet-bulb temperature less than 64°F (18°C).

- Systems requiring dehumidification that employ series-style energy recovery coils wrapped around the cooling coil when the evaporative coil is located upstream of the exhaust air stream.
- Systems exhausting toxic, flammable, paint exhaust, corrosive fumes, or dust.
- Laboratory fume hood systems that include qualifying features.

Plans reference page/section: \_\_\_\_\_

**Requirements Specific To: HVAC System 2 (RTU-2, 3) :**

- 1. Equipment meets minimum efficiency: Heat Pump: 7.70 HSPF 13.00 SEER
- 2. Energy recovery ventilation systems. Individual fan systems that have both a design supply air capacity of 5,000 cfm or greater and a minimum outside air supply of 70 percent or greater of the design supply air quantity have an energy recovery system.

*Exception(s):*

- Where energy recovery systems are prohibited by the International Mechanical Code.
- Systems serving spaces that are not cooled and are heated to less than 60°F.
- Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
- Type 1 kitchen exhaust hoods.
- Cooling systems in climates with a 1-percent cooling design wet-bulb temperature less than 64°F (18°C).
- Systems requiring dehumidification that employ series-style energy recovery coils wrapped around the cooling coil when the evaporative coil is located upstream of the exhaust air stream.
- Systems exhausting toxic, flammable, paint exhaust, corrosive fumes, or dust.
- Laboratory fume hood systems that include qualifying features.

Plans reference page/section: \_\_\_\_\_

- 3. Supply air economizers shall be provided on each cooling system and are capable of providing 100-percent outdoor air, even if additional mechanical cooling is required to meet the cooling load of the building. Systems provide a means to relieve excess outdoor air during economizer operation to prevent overpressurizing the building.

*Exception(s):*

- Cooling equipment less than 54,000 Btu/hr total cooling capacity.

Plans reference page/section: \_\_\_\_\_

**Generic Requirements: Must be met by all systems to which the requirement is applicable:**

- 1. Calculation of heating and cooling loads. Design loads are determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183. Alternatively, design loads have been determined by an approved equivalent computation procedure.
- 2. Equipment and system sizing. Heating and cooling equipment and systems capacity do not exceed the loads calculated in accordance with Section 503.2.1.

*Exception(s):*

- Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
- Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

Plans reference page/section: \_\_\_\_\_

- 3. HVAC Equipment Performance Requirements. Reported efficiencies have been tested and rated in accordance with the applicable test procedure. The efficiency has been verified through certification under an approved certification program or, if no certification program exists, the equipment efficiency ratings are supported by data furnished by the manufacturer.
- 4. Thermostatic Controls. The supply of heating and cooling energy to each zone is controlled by individual thermostatic controls that respond to temperature within the zone.

Plans reference page/section: \_\_\_\_\_

- 5. Heat pump supplementary heat. Heat pumps having supplementary electric resistance heat have controls that, except during defrost, prevent supplementary heat operation when the heat pump can meet the heating load.

Plans reference page/section: \_\_\_\_\_

- 6. Set point overlap restriction. Where used to control both heating and cooling, zone thermostatic controls provide a temperature range or deadband of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the zone is capable of being shut off or reduced to a minimum.

*Exception(s):*

- Thermostats requiring manual change over between heating and cooling modes.

Plans reference page/section: \_\_\_\_\_

7. Optimum Start Controls. Each HVAC system has controls that vary the start-up time of the system to just meet the temperature set point at time of occupancy.

Plans reference page/section: \_\_\_\_\_

8. Off-hour controls. Each zone is provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

*Exception(s):*

- Zones that will be operated continuously.
- Zones with a full HVAC load demand not exceeding 6,800 Btu/h (2 kW) and having a readily accessible manual shutoff switch.

Plans reference page/section: \_\_\_\_\_

9. Shutoff damper controls. Both outdoor air supply and exhaust are equipped with not less than Class I motorized dampers.

*Exception(s):*

- Gravity dampers shall be permitted for outside air intake or exhaust airflows of 300 cfm or less.

Plans reference page/section: \_\_\_\_\_

10. Freeze Protection and Snow melt system controls. Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, include automatic controls capable of shutting off the systems when outdoor air temperatures meet code criteria.

Plans reference page/section: \_\_\_\_\_

11. Separate air distribution systems. Zones with special process temperature requirements and/or humidity requirements are served by separate air distribution systems from those serving zones requiring only comfort conditions; or shall include supplementary control provisions so that the primary systems may be specifically controlled for comfort purposes only.

*Exception(s):*

- [503.2.4.8 +] Zones requiring only comfort heating or comfort cooling that are served by a system primarily used for process temperature and humidity control.

Plans reference page/section: \_\_\_\_\_

12. Humidity control. If a system is equipped with a means to add or remove moisture to maintain specific humidity levels in a zone or zones, a humidity control device is provided.

Plans reference page/section: \_\_\_\_\_

13. Humidity control. Where a humidity control device exists it is set to prevent the use of fossil fuel or electricity to produce relative humidity in excess of 30 percent. Where a humidity control device is used for dehumidification, it is set to prevent the use of fossil fuel or electricity to reduce relative humidity below 60 percent.

*Exception(s):*

- Hospitals, process needs, archives, museums, critical equipment, and other non-comfort situations with specific humidity requirements outside this range.

Plans reference page/section: \_\_\_\_\_

14. Humidity control. Where a humidity control device exists it is set to maintain a deadband of at least 10% relative humidity where no active humidification or dehumidification takes place.

*Exception(s):*

- Heating for dehumidification is provided with heat recovery or heat pumping and the mechanical cooling system efficiency is 10 percent higher than required in section 503.2.3, HVAC equipment performance requirements.

Plans reference page/section: \_\_\_\_\_

15. Ventilation. Ventilation, either natural or mechanical, is provided in accordance with Chapter 4 of the International Mechanical Code. Where mechanical ventilation is provided, the system has the capability to reduce the outdoor air supply to the minimum required by Chapter 4 of the International Mechanical Code.

Plans reference page/section: \_\_\_\_\_

16. Demand controlled ventilation (DCV). DCV is required for spaces larger than 500 ft<sup>2</sup> for simple systems and spaces larger than 150 ft<sup>2</sup> for multiple zone systems.

*Exception(s):*

- Systems with energy recovery complying with Section 503.2.6
- Spaces less than 750 ft<sup>2</sup> (69.7 m<sup>2</sup>) where an occupancy sensor turns the fan off, closes the ventilation damper, or closes the zone damper when the space is unoccupied.

Plans reference page/section: \_\_\_\_\_

17. Kitchen hoods. Kitchen makeup is provided as required by the Oregon Mechanical Specialty Code.

*Exception(s):*

- Where hoods are used to exhaust ventilation air that would otherwise be exhausted by other fan systems.
- Kitchen exhaust systems that include exhaust air energy recovery complying with section 503.2.6.

Plans reference page/section: \_\_\_\_\_

18. Enclosed parking garage ventilation controls. In Group S-2, enclosed parking garages used for storing or handling automobiles employ automatic carbon monoxide sensing devices.

Plans reference page/section: \_\_\_\_\_

19. Duct and plenum insulation and sealing. All supply and return air ducts and plenums are insulated with the specified insulation. When located within a building envelope assembly, the duct or plenum is separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation. All ducts, air handlers and filter boxes are sealed. Joints and seams comply with Section 603.9 of the International Mechanical Code.

*Exception(s):*

- When located within equipment.
- When the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

20. Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of low-pressure supply and return ducts are securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions.

*Exception(s):*

- Continuously welded and locking-type longitudinal joints and seams on ducts operating at static pressures less than 2 inches w.g. pressure classification.

Plans reference page/section: \_\_\_\_\_

21. Medium-pressure duct systems. All ducts and plenums designed to operate medium-pressure are insulated and sealed in accordance with Section 503.2.7. Pressure classifications specific to the duct system are clearly indicated on the construction documents.

Plans reference page/section: \_\_\_\_\_

22. High-pressure duct systems. Ducts designed to operate at high-pressure are insulated and sealed in accordance with Section 503.2.7. In addition, ducts and plenums are leak-tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual.

Plans reference page/section: \_\_\_\_\_

23. Air system balancing. Each supply air outlet and zone terminal device is equipped with means for air balancing in accordance with the requirements of IMC 603.17. Discharge dampers intended to modulate airflow are prohibited on constant volume fans and variable volume fans with motors 10 horsepower.

Plans reference page/section: \_\_\_\_\_

24. Manuals. The construction documents require that an operating and maintenance manual be provided to the building owner by the mechanical contractor. See long description for specifications.

Plans reference page/section: \_\_\_\_\_

25. Air System Design and Control. Each HVAC system having a total fan system motor nameplate hp exceeding 5 hp meets the provisions of Sections 503.2.10.1 through 503.2.10.2.

Plans reference page/section: \_\_\_\_\_

26. Allowable fan floor horsepower. Each HVAC system at fan system design conditions does not exceed the allowable fan system motor nameplate hp (Option 1) or fan system bhp (Option 2) as shown and calculated in requirement details.

*Exception(s):*

- Hospital and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
- Individual exhaust fans with motor nameplate horsepower of 1 hp or less.

Plans reference page/section: \_\_\_\_\_

27. Motor nameplate horsepower. For each fan, the selected fan motor is no larger than the first available motor size greater than the brake horsepower (bhp).

*Exception(s):*

- For fans less than 6 bhp, where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.

- For fans 6 bhp and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.

Plans reference page/section: \_\_\_\_\_

28. Large Volume Fan Systems. Fan systems over 8,000 (7 m<sup>3</sup>/s) cfm without direct expansion cooling coils that serve single zones reduce airflow based on space thermostat heating and cooling demand. A two-speed motor or variable frequency drive reduces airflow to a maximum 60 percent of peak airflow or minimum ventilation air requirement as required by Chapter 4 of the International Mechanical Code, whichever is greater.

Exception(s):

- Systems where the function of the supply air is for purposes other than temperature control, such as maintaining specific humidity levels or supplying an exhaust system.

Plans reference page/section: \_\_\_\_\_

29. All air-conditioning equipment and air-handling units with direct expansion cooling and a cooling capacity at ARI conditions greater than or equal to 110,000 Btu/h that serve single zones have their supply fan operation controlled according to code specific requirements.

Exception(s):

- Systems where the function of the supply air is for purposes other than temperature control, such as maintaining specific humidity levels or supplying an exhaust system.

Plans reference page/section: \_\_\_\_\_

30. Series fan-powered terminal unit fan motors. Fan motors for series fan-powered terminal units are electronically-commutated motors and have a minimum motor efficiency of 70 percent when rated in accordance with NEMA Standard MG 1-2006 at full load rating conditions.

Plans reference page/section: \_\_\_\_\_

## Section 5: Compliance Statement

*Compliance Statement:* The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical alteration project has been designed to meet the 2010 Oregon Energy Efficiency Specialty Code, Chapter 8, requirements in COMcheck Version 3.9.3 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Name - Title

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## Section 6: Post Construction Compliance Statement

- HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.
- HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.
- Written HVAC balancing and operations report provided to the owner.

The above post construction requirements have been completed.

\_\_\_\_\_  
Principal Mechanical Designer-Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date





COM-CHECK INTERIOR LIGHTING ENERGY  
COMPLIANCE CERTIFICATE





COMcheck Software Version 3.9.2

# Interior Lighting Compliance Certificate

## 2010 Oregon Energy Efficiency Specialty Code

### Section 1: Project Information

Project Type: **Alteration**

Project Title : University of Oregon Lawrence Hall Second Floor Remodel

Construction Site:

Owner/Agent:

Glenn Macdonald  
University of Oregon Facilities  
1296 Franklin  
Eugene, OR

Designer/Contractor:

Jim Krumsick  
Paradigm Engineering  
97405

### Section 2: Interior Lighting and Power Calculation

A Area Category	B Floor Area (ft <sup>2</sup> )	C Allowed Watts / ft <sup>2</sup>	D Allowed Watts (B x C)
Open Office (Common Space Types:Office - Open Plan) (Ceiling Height 12 ft.)	420	0.99(a)	416
Hub (Common Space Types:Lobby) (Ceiling Height 12 ft.)	417	1.28	534
Classroom / Pinup (Common Space Types:Classroom/Lecture/Training) (Ceiling Height 10 ft.)	540	1.23	664
Classroom / Pinup (Common Space Types:Classroom/Lecture/Training) (Ceiling Height 10 ft.)	588	1.23	723
Conference Room (Common Space Types:Conference/Meeting/Multipurpose) (Ceiling Height 8 ft.)	170	1.11	189
Private Offices (Common Space Types:Office - Enclosed): Exempt (Ceiling Height 10 ft.)			
Total Allowed Watts =			2526

(a) Allowed watts per sq. ft. adjusted for ceiling height.

#### Area Category Exemption Qualifications

Activity Area	Total Wattage		Total Pre-Alt. Fixtures	# Fixtures Repl./Added
	Pre-Alt.	Post-Alt.		
Private Offices ( Common Space Types:Office - Enclosed 694 sq.ft.): Exemption: Less than 10 fixtures replaced.	96	96	N/A	2

### Section 3: Interior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Open Office ( Common Space Types:Office - Open Plan 420 sq.ft.)				
LED 4: C: Pendant LED: LED Linear 11W:	1	2	5	10
LED 7: A: Linear High Output LED: Other:	2	8	40	320
Hub ( Common Space Types:Lobby 417 sq.ft.)				
LED 3: G: LED Light Form: Other:	1	1	87	87
LED 6: D2: 1800 Lumen Downlight: Other:	1	10	29	290
LED 8: D: 1000 Lumen Downlight: Other:	1	8	21	168
Classroom / Pinup ( Common Space Types:Classroom/Lecture/Training 540 sq.ft.)				
Linear Fluorescent 2: 48" T8 32W (Super T8): Premium efficiency:	2	12	48	576
Classroom / Pinup ( Common Space Types:Classroom/Lecture/Training 588 sq.ft.)				
Linear Fluorescent 3: 48" T8 32W (Super T8): Premium efficiency:	2	12	48	576

Conference Room ( Common Space Types:Conference/Meeting/Multipurpose 170 sq.ft.)				
LED 5: A2: Linear High Output LED: Other:	1	1	80	80
LED 9: D: 1000 Lumen Downlight: Other:	1	4	21	84
Private Offices ( Common Space Types:Office - Enclosed 694 sq.ft.): Exempt				
Linear Fluorescent 1: 48" T8 28W (Super T8): Premium efficiency:	2	16	44	704
Total Proposed Watts =				2191

## Section 4: Requirements Checklist

In the following requirements, blank checkboxes identify requirements that the applicant has not acknowledged as being met. Checkmarks identify requirements that the applicant acknowledges are met or excepted from compliance. 'Plans reference page/section' identifies where in the plans/specs the requirement can be verified as being satisfied.

### Lighting Wattage:

- ✓ 1. Total proposed watts must be less than or equal to total allowed watts.  
 Allowed Wattage: 2526    Proposed Wattage: 2191  
 Complies: YES

### Mandatory Requirements:

- ✓ 2. Exit signs. Internally illuminated exit signs shall not exceed 5 watts per side.  
 Plans reference page/section: No new exit signs
- ✓ 3. Daylight zone control. All daylight zones are provided with individual controls that control the lights independent of general area lighting in the non-daylight zone. In all individual daylight zones larger than 350 sq.ft., automatic daylight controls is provided. Automatic daylight sensing controls reduce the light output of the controlled luminaires at least 50 percent, and provide an automatic OFF control, while maintaining a uniform level of illumination. Contiguous daylight zones adjacent to vertical fenestration may be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). Daylight zones under skylights shall be controlled separately from daylight zones adjacent to vertical fenestration.  
 Plans reference page/section: \_\_\_\_\_
- ✓ 4. Interior lighting controls. At least one local shutoff lighting control has been provided for every 2,000 square feet of lit floor area and each area enclosed by walls or floor-to-ceiling partitions. The required controls are located within the area served by the controls or are a remote switch that identifies the lights served and indicates their status.  
 Plans reference page/section: \_\_\_\_\_
- ✓ 5. Sleeping unit controls. Master switch at entry to hotel/motel guest room.  
 Plans reference page/section: Not Applicable
- ✓ 6. Egress lighting. Egress illumination is controlled by a combination of listed emergency relay and occupancy sensors to shut off during periods that the building space served by the means of egress is unoccupied.  
 ✓ **Exception applies:** Building exits as defined in Section 1002 of the Oregon Structural Specialty Code.  
 Plans reference page/section: \_\_\_\_\_
- ✓ 7. Additional controls. Each area that is required to have a manual control shall have additional controls that meet the requirements of Sections 505.2.2.1 and 505.2.2.2.  
 Plans reference page/section: \_\_\_\_\_
- ✓ 8. Light reduction controls. Each space required to have a manual control also allows for reducing the connected lighting load by at least 50 percent by either
  - 1) controlling (dimming or multi-level switching) all luminaires; or
  - 2) dual switching of alternate rows of luminaires, alternate luminaires, or alternate lamps; or
  - 3) switching the middle lamp luminaires independently of other lamps; or
  - 4) switching each luminaire or each lamp.
 Plans reference page/section: \_\_\_\_\_
- ✓ 9. Buildings larger than 2,000 square feet are equipped with an automatic control device to shut off lighting in those areas. This automatic control device shall function on either:
  - 1) a scheduled basis, using time-of-day, with an independent program schedule that controls the interior lighting in areas that do not exceed 10,000 square feet and are not more than one floor; or
  - 2) an occupant sensor that shall turn lighting off within 30 minutes of an occupant leaving a space; or
  - 3) a signal from another control or alarm system that indicates the area is unoccupied.
 Plans reference page/section: Not Applicable
- ✓ 10. Occupancy sensors in rooms that include daylight zones are required to have Manual ON activation.  
 Plans reference page/section: \_\_\_\_\_



✓ 11. An occupant sensor control device is installed that automatically turns lighting off within 30 minutes of all occupants leaving a space.

✓ **Exception applies:** Office spaces up to 300 square feet.

Plans reference page/section: \_\_\_\_\_

✓ 12. Additional controls. An occupant sensor control device that automatically turns lighting off within 30 minutes of all occupants leaving a space or a locally activated switch that automatically turns lighting off within 30 minutes of being activated is installed in all storage and supply rooms up to 1000 square feet.

Plans reference page/section: *Not Applicable*

✓ 13. Occupant override. Automatic lighting shutoff operating on a time-of-day scheduled basis incorporates an override switching device that: 1) is readily accessible, 2) is located so that a person using the device can see the lights or the area controlled by that switch, or so that the area being lit is annunciated, 3) is manually operated, 4) allows the lighting to remain on for no more than 2 hours when an override is initiated, and 5) controls an area not exceeding 2,000 square feet.

Plans reference page/section: \_\_\_\_\_

✓ 14. Holiday scheduling. Automatic lighting shutoff operating on a time-of-day scheduled basis has an automatic holiday scheduling feature that turns off all loads for at least 24 hours, then resumes the normally scheduled operation.

Plans reference page/section: *Not Applicable*

✓ 15. Exterior lighting controls. Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor.

Plans reference page/section: *Not Applicable*

✓ 16. Tandem wiring. The following luminaires located within the same area shall be tandem wired:

1. Fluorescent luminaires equipped with one, three or odd-numbered lamp configurations, that are recess-mounted within 10 feet center-to-center of each other.

2. Fluorescent luminaires equipped with one, three or any odd-numbered lamp configuration, that are pendant- or surface-mounted within 1 foot edge- to-edge of each other.

✓ **Exception applies:** Where electronic high-frequency ballasts are used.

Plans reference page/section: \_\_\_\_\_

✓ 17. Medical task lighting or art/history display lighting claimed to be exempt from compliance has a control device independent of the control of the nonexempt lighting.

Plans reference page/section: *Not Applicable*

✓ 18. Each dwelling unit in a building is metered separately.

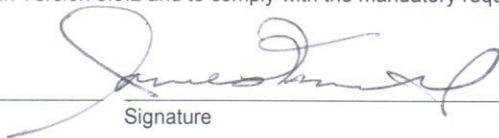
Plans reference page/section: *Not Applicable*

**Interior Lighting PASSES**

**Section 5: Compliance Statement**

*Compliance Statement:* The proposed lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 2010 Oregon Energy Efficiency Specialty Code requirements in COMcheck Version 3.9.2 and to comply with the mandatory requirements in the Requirements Checklist.

James Krumsich DE  
Name - Title

  
Signature

6-2-2014  
Date