

**University of Oregon
1900 Millrace Drive,
Innovation Center
Lab 113N and 113S Renovation**

Project Manual

December 4, 2013

Set No. _____

BHE Project No. 8900-001-13



BALZHISER & HUBBARD ENGINEERS

Mechanical • Electrical • Civil • Surveying
100 West 13th Avenue, Eugene, Oregon 97401
Phone: (541) 686-8478 • Fax: (541) 345-5303
www.bhengineers.com

UNIVERSITY OF OREGON

I1900 Millrace Innovation Center
Lab 113N and 113S Renovation

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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 Capital Construction Offices 1205 Franklin Blvd, until **2:00 PM, Pacific Time, January 8, 2014** (“Closing Date and Time”) for the 1900 Millrace Innovation Center Lab 113N and 113S Renovation project located on the Riverfront Research Park campus of the University of Oregon, in Eugene, Oregon (“Project”). The project addresses revisions needed to the building MEP systems to support the addition of an owner provided fume hood in each laboratory. The work includes the installation of a laboratory exhaust fan, make-up air conditioning unit, supply/exhaust ductwork, plumbing for the fume hoods, electrical services and a slab-on-grade fenced enclosure for the new equipment.

A mandatory pre-bid conference will be conducted at 2:00 PM, Pacific Time, December 18, 2013. Bidders shall meet with OUS Representative in the lobby of the Innovation Center at 1900 Millrace Drive 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.

Questions and requests for clarifications will be accepted until 2:00 PM, Pacific Time, January 2, 2014.

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 RETAINER CONTRACT
INSTRUCTIONS TO BIDDERS

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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: 1900 Millrace Innovation Center Lab 113N and 113S Renovation

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.

RESERVED

OREGON UNIVERSITY SYSTEM
STANDARD RETAINER CONTRACT
BID FORM

OUS CAMPUS: UNIVERSITY OF OREGON

PROJECT: 1900 Millrace Innovation Center Lab 113N and 113S Renovation

BID CLOSING DATE: Monday, December 23 2013, at 2:00 PM

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
1205 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)

• Any ADDENDA numbered ____ through____, inclusive (*fill in blanks*).

2. The work shall be completed within the time stipulated and specified in Division 1, Section 01 11 00, 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 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.

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**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

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:*	\$ _____
<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 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

**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]

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: _____

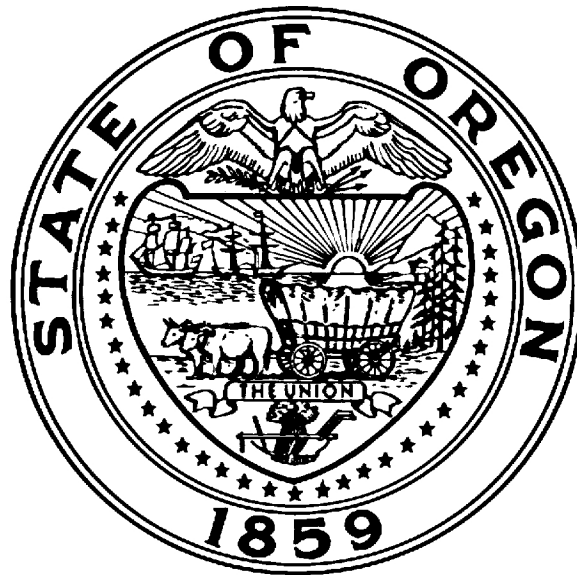
Date: _____

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: July 1, 2013

http://www.oregon.gov/boli/WHD/PWR/Pages/July_2013_Index.aspx

As Amended: October 1, 2013

http://www.oregon.gov/boli/WHD/PWR/docs/October_1_2013_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

REPORT BEING SUBMITTED	
-------------------------------	--

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 - minority-owned MWESB subcontractors	\$0.00
% - minority-owned MWESB subcontractors	
Value - women-owned MWESB subcontractors	\$0.00
% - women-owned MWESB subcontractors	
Value - emerging small business MWESB subcontractors	\$0.00
% - emerging small business MWESB subcontractors	

SELF-IDENTIFIED or OTHER CERTIFIED MWESB TOTALS

Value - self-identified or other certified subcontractors	\$0.00
% - self-identified or other certified 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	

SECTION 01 11 00

SUMMARY OF WORK

Part 1 - General

1.01 CONTRACT DESCRIPTION

- A. Project Location:
 - 1. University of Oregon, Innovation Center, 1900 Millrace Drive, Eugene, Oregon
- B. General Description: Upgrade existing building HVAC and plumbing services for new fume hoods to be installed Lab 113N and Lab 113S by owner.
- C. The work covered in the contract documents includes, but is not limited to, all necessary materials and labor to: provide revisions needed to the building MEP systems to support the addition of an owner provided fume hood in each laboratory. The work includes the installation of a laboratory exhaust fan, make-up air conditioning unit, supply/exhaust ductwork, plumbing for the fume hoods, electrical services and a slab-on-grade fenced enclosure for the new equipment.
- D. Contractor's Duties:
 - 1. Provide and pay for labor, materials, tools, equipment, superintendence, temporary facilities and services necessary for proper execution and completion of the work.
 - 2. Comply with building codes, ordinances and regulations of public authorities.
 - 3. Obtain all permits, arrange for required inspections, and provide approved inspection reports to Owner per Section 01 77 00. Owner will pay all plan check, systems development, and permit fees.
- E. Milestones:
 - 1. Start Construction..... January 13, 2014
 - 2. Project Substantial Completion Date March 28, 2014
 - 3. Final Completion Date..... April 8, 2014
- F. Do not commence Work until after execution of the Agreement, and receipt of Notice to Proceed from Owner.

1.02 CONTRACTORS USE OF PREMISES

- A. Contractor shall limit use of the premises for work and storage to allow for:
 - 1. Public access around the facility.
 - 2. Owner access to the facility.
 - 3. Security.
 - 4. Safe entry and exit for vehicles and pedestrians.
- B. Coordinate operations with the Owner's Representative during the construction period.
- C. Limit Contractor's employee parking to locations designated at the Pre-construction Conference.
- D. Site visits for the purpose of dimensional verification and coordination will be allowed before the on-site Work start date but must be coordinated with the Owner's Representative.
- E. All required shutdowns must be requested by the Contractor to the Owner's Project Manager a minimum of two (2) weeks in advance. Coordinate duration and scheduling of the shutdown with the Owner's Representative.
- F. Contractor shall coordinate access to premises with Owner's Representative for execution of the work. Emergency situations may cause the temporary suspension of the work.
- G. Confine operations at site to areas permitted by Owner's Representative.

- H. Do not unreasonably encumber Site with materials or equipment. Contractor shall move any stored products, under Contractor's control, which interfere with operations of Building.
- I. Do not load structure with weight that will endanger structure.
- J. Assume full responsibility for protection and safekeeping of products and equipment stored on premises.
- K. Obtain and pay for use of additional storage or work areas required for operations.
- L. In general storage and/or parking is not available in this area.
- M. For all disruptive, noise, odor, etc work within occupied buildings (or close neighboring buildings) the Contractor must notify the Owner's Project Manager for distribution of such notice to campus a minimum of 72 hours prior to start of such work.

1.03 OWNER OCCUPANCY

- A. Owner and Owner's Tenants will partially occupy the building during construction. Maintain full required egress from building during the construction period.
- B. All existing building systems shall be operational during the construction period.
- C. Coordinate with owner to minimize disruption or interruption of building access, exitways, and utilities.
- D. Coordinate construction schedule and site operations with Owner's Representative to eliminate schedule conflicts and to facilitate Owner and Owner's Tenants use of the site. On-site work hours are 7:00 a.m. to 5:00 p.m., unless specifically modified in writing by the Owner's Project Manager.
- E. Refer to floor plan on mechanical detail drawing showing temporary partitions required to control dust inside the tenant occupied space.

1.04 EXAMINATION OF SITE

- A. Data in these Specifications and on the Drawings are as accurate as possible, but are not guaranteed. Bidders shall visit the site, familiarize themselves with all existing conditions and be prepared to carry out the work within the existing limitations. The Contractor shall verify locations, levels, distances, conditions of finishes, and features related to the improvements that may affect the work. No allowances will be made in the Contractor's behalf for any extra expense resulting from failure or neglect in determining the conditions under which work is to be performed.

1.05 CHANGES TO THE WORK

- A. Changes to the work may be initiated by Engineer, Owner, or Contractor. Contractor is not to proceed with any changes to the work until request has been made in writing. Changes shall be made in accordance with Section 01 26 00 Change Order Procedures.

1.06 MATERIALS AND PRODUCT OPTIONS

- A. Product listings are for informational purposes establishing a general standard of quality and the University of Oregon is making no warranty of availability or fitness of the products for use. See Section 01 16 00, Material and Equipment, and Section 01 25 00, Substitutions and Product Options.

1.07 SAFETY

- A. Precaution shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws, building and construction codes shall be observed. In no case shall the Owner or Engineer be responsible for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the work, nor shall the Owner or Engineer be responsible for the Contractor's failure to employ proper safety procedures.

1.08 REUSE OF EXISTING MATERIAL

- A. Except as specifically indicated or specified, materials and equipment removed from existing construction shall not be used in the completed Work.
- B. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products which require off site storage, restoration, or renovation. Pay costs for such work.
 - 3. Contractor shall be responsible for removal and reinstallation of the item as well as supporting components.

1.09 MATERIALS AND EQUIPMENT

- A. Unless otherwise specified, material and equipment shall be new; free from defects impairing strength, durability, and appearance; of current manufacture. Items specified shall be considered minimum as to quality, function, capacity, and suitability for application intended.
- B. Items incorporated into the Work shall conform to applicable specifications and standards designated, and shall be of size, make, type, and quality specified, unless otherwise approved.
- C. Product listings are for informational purposes establishing a general standard of quality and the Owner is making no warranty of availability or fitness of the products for use. Refer to Section 01 60 00, MATERIAL AND EQUIPMENT, and Section 01 25 00, SUBSTITUTIONS AND PRODUCT OPTIONS.

1.10 MANUFACTURED AND FABRICATED PRODUCTS

- A. Design, fabricate, and assemble in accordance with current best engineering, industry, and shop practices. Manufacture like parts of duplicate units to standard size and gauge to make them interchangeable.
- B. Two or more items of the same kind shall be identical and made by the same manufacturer.

1.11 USE OF SITE

- A. Work Area Access: Buildings may be partially occupied during work. Access to the work area will be available on a week day basis from approximately 7:00 a.m. to 5:00 p.m. Coordinate all other work hour schedules with Owner so as not to interfere with Owner's use of the building.
- B. Limit use of the premises to construction activities in areas indicated; allow for building occupancy, subject to approval by an Owner's project manager.
- C. Site Access: Maintain drives and building entrances and exits clear at all times to Owner's, employees, and public access and for use by emergency personnel. Do not use these areas for parking or storage. Schedule deliveries to minimize space and time requirements for storage of materials at site.
- D. Parking: Contractor may use existing parking areas as approved by Owner's Project Manager.
- E. Contractor Staging Areas: Limit staging to areas as approved by Owner's Project Manager.

F. Construction Operations: Limited to areas indicated on Drawings.

1.12 POTENTIALLY HAZARDOUS PRODUCTS

- A. The Owner attempts to maintain a safe and healthy environment for Owner's staff and Tenants. The Contractor is therefore required to follow Owner guidelines controlling the use of potentially hazardous products and to use these products in a safe manner.
- B. MSDS information is required for all potentially hazardous products. The Owner's Project Manager will review these and determine what, if any, mitigation procedures will be required.
- C. Contractor is to maintain and post copies of all MSDS information at the project site and adhere to the required controls.
- D. Contractor is to ensure that work area by Tenants is restricted except as allowed for access to the Attic. The Owner will provide signage appropriate for this purpose. The Contractor is to construct and maintain appropriate barriers.

1.13 PREPARATION

- A. Inspect existing conditions, project requirements and the Contract Documents. Verify that materials and equipment being furnished meet requirements specified.

1.14 MATERIAL HANDLING

- A. If, in the opinion of the Contractor, lifting devices are necessary for the proper and efficient movement of materials, comply with these requirements;
 - 1. Use only experienced personnel.
 - 2. Remove equipment as soon as possible after task is ended.
 - 3. Coordinate the placement of such equipment with the Owner's Representative to insure that utility tunnels, utilities and surfaces are not damaged.
 - 4. Obtain required permits and meet the requirements of governing authorities regarding street and sidewalk closures, safety, noise, and other applicable regulations.

1.15 QUALITY OF WORK

- A. Unless otherwise specified, perform the Work using workers skilled in the particular type of work involved.
- B. Should the Owner, in writing, deem anyone on the Work incompetent or unfit for the assigned duties, dismiss the worker immediately or reassign the worker to a different task requiring a lesser degree of competence.
- C. Work shall be first class in every respect and Work performed shall be according to the best trade practices.
- D. The Contractor shall maintain effective supervision on the project during any time Work is being performed. The Superintendent shall be the same person throughout the project and shall attend the Pre-construction Conference.

1.16 TESTING

- A. The Owner reserves the right to perform any testing as may be required to determine compliance with the Project Manual. Costs for such testing will be the Owner's responsibility unless testing indicates noncompliance. Cost for such testing indicating noncompliance shall be borne by the Contractor. Non-complying Work shall be corrected and testing will be repeated until the Work complies with the Project Manual. Contractor will pay costs for retesting non-complying Work.
- B. The Contractor shall cooperate in every respect with the activities of the testing agency.

Part 2 - Products (Not used)

Part 3 - Execution (Not used)

END OF SECTION

SECTION 01 23 00

ALTERNATES

Part 1 - General

1.01 DESCRIPTION

- A. Alternates described in this Section may be exercised at the option of the Owner with execution of the Owner/Contractor Agreement.
- B. The Owner generally exercises Alternates in numerical order. Alternates may be accepted, however, without regard to order or sequence. Such acceptance shall not impair selection of a low, responsible and responsive bidder to whom the Contract may be awarded under an equitable bid procedure.
- C. Alternate: An amount proposed by Bidder and stated on Bid form, to be added to or deducted from the Base Bid amount when the Owner elects to implement the Scope of Work represented by the corresponding alternate as defined by the Contract Documents and including miscellaneous devices, appurtenances and accessories necessary for a complete installation regardless of whether specifically mentioned as part of the alternate.
 - 1. Additive Alternate: Adds to the Base Bid if selected for implementation by the Owner.
 - 2. Deductive Alternate: Deducts from the Base Bid if selected for implementation by the Owner.
 - 3. Alternate Sums Stated on the Bid Form: Valid for 90 days from the bid due date, and the Owner shall have the right to modify the Contract in accordance with the requirements for each and any Alternate at the as-bid sum during that period.

1.02 QUALITY ASSURANCE

- A. Coordinate the Work of the various trades involved for each Alternate Accepted, and modify surrounding Work as required to complete the Project as intended.
- B. Change-in-price figure for each Alternate, shall include incidental costs attributable to adjustments in the Work of other trades which may be required to achieve the contemplated and final conditions.
- C. For questions regarding extent, scope, nature, or intent of alternate(s), contact Owner for clarification. Failure on the part of Contractor to clarify unclear items shall not relieve Contractor of responsibility for performing selected Alternate(s) in accordance with the intent and requirements of the Contract Documents.
- D. Description of Alternates hereinafter is qualitative not quantitative. Contractor shall determine quantities of labor and materials and extent of same required to execute selected Alternates in accordance with the intent and requirements of the Contract Documents.

Part 2 - Products

2.01 GENERAL

- A. The applicable Sections of the Specifications apply to the Work under each Alternate.

Part 3 - Execution

3.01 LIST OF ALTERNATES

- A. There are no alternates for this project.

END OF SECTION

SECTION 01 25 00

SUBSTITUTIONS AND PRODUCT OPTIONS

Part 1 - General

1.01 DESCRIPTION

- A. Section describes requirements for product substitutions during the course of Work.

1.02 CONTRACTOR'S OPTIONS

- A. For products specified only by reference standards, select any product meeting standards by any manufacturer.
- B. For products specified by naming products or manufacturers, select any product and manufacturer named.
- C. For products specified by naming only one product and manufacturer when necessary there is no option.

1.03 SUBSTITUTIONS

- A. During bidding period, Instructions to Bidders govern times for submitting requests for substitutions under requirements specified in this Section.
- B. After Bid award, Engineer and Owner will consider formal requests for Contractor for substitution of products in place of those specified when submitted in accordance with the requirements of this Section. One or more of the following conditions must also be documented:
 - 1. Substitution shall be required for compliance with final interpretation of code requirements or insurance regulations.
 - 2. Substitution shall be due to unavailability of specified products, through no fault of Contractor.
 - 3. Substitution may be requested when subsequent information discloses inability of specified products to perform properly or to fit in designated space.
 - 4. Substitution may be due to manufacturer's or fabricator's refusal to certify or guarantee performance of specified product as required.
 - 5. Owners request.
 - 6. Reduction in Contract time or Contract sum. Substitution may be allowed if any product specified is significantly higher in cost than the proposed substitution and the proposed substitution receives the Engineers approval and the contractor is willing to negotiate a credit to the contract sum.
- C. Submit seven copies of Request for Substitution. Include in request:
 - 1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 - 2. Product identification, including manufacturer's name and address.
 - 3. Manufacturer's literature:
 - a. Product description.
 - b. Performance and test data.
 - c. Reference standards.
 - 4. Samples.
 - 5. Name and address of similar projects on which product was used and date of installation.
 - 6. Itemized comparison of proposed substitution with product or method specified.
 - 7. Data relating to changes in construction schedule.
- D. For requests submitted after Contract Award, provide accurate cost data on proposed substitution in comparison with product or method specified.

- E. In making Request for Substitution, contractor represents:
 - 1. He has personally investigated proposed product or method and determined it equal or superior in all respects to that specified.
 - 2. He will provide same guarantee for substitution as for product specified.
 - 3. He will coordinate installation of accepted substitution into Work, making such changes as required for Work to be complete in all respects.
 - 4. He waives all claims for additional costs related to substitution which consequently become apparent.
 - 5. Cost data is complete and includes all related costs under his Contract, but excludes cost under separate contracts and Engineer redesign.

- F. Substitutions will not be considered if:
 - 1. They are indicated or implied on shop drawings or project data submittals without request submitted as specified in this section.
 - 2. Acceptance will require substantial revision of Contract Documents.

1.04 ACCEPTANCE

- A. If the Contractor complies with the requirements of this Section and in the Engineer's opinion, the proposed product is acceptable in lieu of the one or more specified, the Engineer will issue an Architect's Supplemental Instructions (AIA G710) where contract sum or time is not effected, or a Change Order Request where contract sum or time is effected.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 26 00

CHANGE ORDER PROCEDURES

Part 1 - General

1.01 SECTION INCLUDES

- A. Submittals.
- B. Documentation of change in Contract Sum/Price and Contract time.
- C. Change procedures.
- D. Construction Change Directive
- E. Stipulated sum change order.
- F. Time and material change order.
- G. Execution of change orders.
- H. Correlation of Contractor submittals.

1.02 SUBMITTALS

- A. Contractor shall submit in writing, the names of those individuals considered to be "authorized" to execute agreements, Change Orders, Construction Change Directives, certifications, etc. on behalf of the Contractor and be responsible for informing others in Contractor's employ or subcontractors of changes to the Work.

1.03 DOCUMENTATION OF CHANGE IN CONTRACT SUM/PRICE AND CONTRACT TIME

- A. Maintain detailed records of work done on a time and material basis, submitted to Owner's representative daily. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.
- B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
- C. On request, provide additional data to support computations:
 - 1. Quantities of products, labor, and equipment.
 - 2. Taxes, insurance and bonds.
 - 3. Overhead and profit.
 - 4. Justification for any change in Contract Time.
 - 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work done on a time and material basis, with additional information:
 - 1. Origin and date of claim.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time records and wage rates paid.
 - 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 - 5. Submit an itemized list of labor and materials including not more than 15 percent overhead and profit with each Construction Change Directive.

1.04 CHANGE PROCEDURES

- A. Comply with Oregon University System Standard General Conditions, Changes in Work Ordered by Owner and Basis of Adjustment in Contract Amount.

- B. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract time by issuing supplemental written instructions.
- C. The Engineer may issue a Proposal Request (PR) which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications, a change in Contract time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit fixed price quotation within 5 working days.
- D. The Engineer may issue an Engineer's Supplemental Instruction (ESI) which includes a detailed description of a proposed clarification with supplementary or revised Drawings and Specifications. Contractor will advise and submit fixed price quotation within 5 working days, if clarification has costs involved.
- E. The Contractor may propose a change by submitting a request for change to the Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 25 00.
- F. All Proposal Requests shall result in a Construction Change Directive (CCD) for review and action by Owner.

1.05 CONSTRUCTION CHANGE DIRECTIVE (CCD)

- A. Engineer may issue a Construction Change Directive (CCD) signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum/Price or Contract Time.
- C. Contractor shall promptly execute the change in Work.

1.06 STIPULATED SUM CHANGE ORDER

- A. Based on Construction Change Directive (CCD) and Contractor's fixed price quotation, a Change Order will be prepared and processed for those items accepted.

1.07 TIME AND MATERIAL CHANGE ORDER

- A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- B. Engineer will recommend to the Owner any change allowable in Contract Sum/Price and Contract time as provided in the Contract Documents.
- C. Maintain detailed records of work done on Time and Material basis, submitted to Owner's representative daily.
- D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.08 EXECUTION OF CHANGE ORDERS

- A. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- B. Change Orders are not authorized unless signed by Owner, Contractor, and Engineer.

- C. Order of Signature: All Change Orders shall be signed in the following order:
 - 1. Contractor.
 - 2. Engineer.
 - 3. Owner.

1.09 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.
- B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust time for other items of work affected by the change, and resubmit.
- C. Promptly enter changes in Project Record Documents.

1.10 LOGS

- A. Contractor shall maintain accurate logs for all Proposal Requests, Construction Change Directives, and Change Orders showing amount, status, etc.
- B. Logs to be submitted with each Application for Payment.

Part 2 - Products (Not Used)

Part 3 - Execution

3.01 FORMS

- A. Sample forms follow this Section.

END OF SECTION

SECTION 01 29 00

APPLICATIONS FOR PAYMENT

Part 1 - General

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of Applications for Payment.

1.02 FORMAT

- A. AIA Document G702 - Application and Certificate for Payment 1992 Edition, including continuation sheets when required or Owner approved equal.

1.03 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
1. Correlate line items in the Schedule of Values with other required administrative forms and schedule, including the following:
 - a. Application for Payment forms with Continuation Sheets
 - b. Submittals Schedule
 - c. Contractor's Construction Schedule
 2. Submit the Schedule of Values to Engineer and Owner at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Application for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each specification section.
1. Identification: Include the following Project identification on the Schedule of Values.
 - a. Project name and location
 - b. Name of Architect
 - c. Architect's project number
 - d. Contractor's name and address
 - e. Date of submittal
 2. Submit draft of AIA Document G703, Continuation Sheets or Owner approved equal.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of the part of the Work.
 7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
 9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.04 PREPARATION OF APPLICATIONS

- A. Present required information in typewritten form or on electronic media print.
- B. Execute certification by signature of authorized officer. Contractor shall designate in writing, the names of those individuals considered to be "authorized" to execute agreements, certifications, etc. on behalf of the Contractor.
- C. 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.
- D. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work. Do not include change orders which have not been fully executed prior to the date of application for payment.
- E. Prepare Application for Final Payment as specified in Section 01 77 00.

1.05 SUBMITTAL PROCEDURES

- A. Submit 3 copies of each Application for Payment.
- B. Submit an updated construction schedule with each Application for Payment.
- C. Payment Period: Submit at monthly intervals.
- D. Comply with General Conditions, Application for Payments by Contractor.
- E. Provide Certificate of Insurance covering the value of materials stored off-site.
- F. Pay Owner's and Engineer's travel and subsistence costs to inspect items stored off-site for which payment is requested.
- G. Prevailing Wage Rates: Submit 3 copies of wage certifications with Application for Payment in accordance with ORS Chapter 279. Submit in accordance with prescribed schedule. Submit certified copies of wage certifications to State of Oregon, BOLI in accordance with ORS Chapter 279.

1.06 SUBSTANTIATING DATA

- A. When Owner or Engineer requires substantiating information, submit data justifying dollar amounts in question.
- B. Provide 3 copies of data with cover letter for each item submitted. Show application number and date, and line item by number and description.

1.07 PROGRESS SCHEDULE

- A. Submit in accordance with Section 01 32 00.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 31 00

COORDINATION

Part 1 - General

1.01 GENERAL

- A. Coordinator: Contractor is responsible for overall coordination of Project.
 - 1. 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.
 - 2. Coordination shall not be limited to Contractor's activities under this project, but shall extend to all trades, delivery activities, and work of other projects including work of the Owner in accordance with General Conditions.
 - 3. Contractor shall coordinate all work so that all specified individual work tolerances are achieved. Tolerances shown or specified within assemblies are not cumulative.
 - 4. Schedule and coordinate the performance of all work on site with the Owner's Representative.
- B. Schedule work in accordance with current Project Progress Schedule and other work in this space.
 - 1. Coordinate schedules of all trades.
 - 2. Verify timely deliveries of products for installation by all trades.
 - 3. Verify that labor and equipment are adequate for work and schedule.
 - 4. Verify that material deliveries are adequate to maintain schedule.
- C. Coordinate changes to assure that:
 - 1. Requirements of Contract Documents are fulfilled.
 - 2. Changes in Contract requirements of all affected trades are reflected in executed Change Orders.
- D. Maintain Record Documents.
- E. Ascertain need for cutting and patching.
 - 1. Coordinate with work of other trades.

1.02 DIVISION OF RESPONSIBILITIES

- A. For convenience, these Specifications are arranged in several trade sections, but in no case shall such separation be considered as the limits of the work required of any sub-contractor or trade. The terms and conditions of such limitations are wholly between the Contractor and the subcontractor(s).

1.03 PROJECT DRAWINGS

- A. Mechanical, architectural and electrical drawings are diagrammatic. Additional components such as offsets and bends may be required.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 31 50

PROJECT MEETINGS

Part 1 - General

1.01 PRE-CONSTRUCTION MEETING

- A. Engineer, Contractor, and Owner will meet prior to start of construction (within seven days after notice to proceed) to discuss at least the following topics and any others of mutual interest.
 - 1. Signed contracts.
 - 2. List of subcontractors.
 - 3. Insurance coverage.
 - 4. Bonds.
 - 5. Job Inspections.
 - 6. Early purchase of, and/or lead time requirements for material and equipment.
 - 7. Pre-purchased equipment
 - 8. Monthly payment date.
 - 9. Portion of site to be occupied by construction.
 - 10. Parking.
 - 11. Maintenance of access and safety.
 - 12. Processing of field decisions and change orders.
 - 13. Labor provisions.
 - 14. Material Submittals.
 - 15. Owner access during construction.
 - 16. Review of Contract Documents.
 - 17. Coordination procedures and separate contracts.
 - 18. Progress Schedule.
 - 19. Critical work sequencing.
 - 20. Safety and Emergency Procedures.
 - 21. Security Procedures
 - 22. Hazardous Materials.

1.02 PROGRESS MEETINGS

- A. The Contractor will schedule and administer Progress Meetings and will:
 - 1. Prepare Agendas.
 - 2. Schedule progress meetings each week at time and day to be determined.
 - 3. Make physical arrangements for and preside at meetings.
 - 4. Record minutes and include decisions.
 - 5. Distribute copies of minutes to the following, within 4 days after meetings:
 - a. Meeting participants
 - b. Parties affected by decisions
 - c. Owner
 - d. Engineer
 - e. Architect
- B. Location of Meetings: Project site.
- C. Attendance:
 - 1. The Owner or the Owner's Representative
 - 2. Contractor
 - 3. Subcontractors affected by agenda
 - 4. Project Engineer

5. Minimum Agenda:
6. Review and approve minutes from previous meeting.
7. Review work progress since previous meeting.
8. Discuss field observations, conflicts, and issues.
9. Review delivery schedules, construction schedule, and identify problems which impede planned progress.
10. Review proposed changes.
11. Material Submittals.
12. Note all new subcontractors performing work at the job site.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 32 00
PROGRESS SCHEDULE

Part 1 - General

1.01 DESCRIPTION

- A. WORK INCLUDED: Submit progress schedule as specified in this and other Sections.
- B. Submit to Owner for Approval: Progress Schedules.
- C. Owners Representative and Contracting Officer will review submittals for conformance with Contract Documents.

1.02 PROGRESS SCHEDULE AND PROGRESS REPORT REQUIREMENTS

- A. Content:
 - 1. Show product delivery and installation dates for all major products.
 - 2. Show dates for Substantial Completion and Final Completion.
 - 3. Show anticipated dates for outages of any building utilities.
- B. Updating:
 - 1. Indicate progress of each activity, show revised completion dates.
 - 2. Provide listing of current and anticipated accelerations and delays.
 - 3. Describe proposed corrective action when required.

1.03 CORRECTIONS

- A. Owner will review for conformance with the contract documents and return the submittals requiring corrective action, with such corrections noted thereon.
- B. Immediately incorporate required corrections in submittals and resubmit for further review, if required.

1.04 REQUIRED SUBMITTAL QUANTITIES TO CONTRACTING OFFICER

	<u>Reproducible Transparencies</u>	<u>Opaque Prints</u>
A. Construction Schedule: 8-1/2 x 11 in. size	0	1

1.05 SCHEDULE FOR SUBMITTALS: (QUANTITIES IN DAYS)

<u>Contractor</u>	<u>First Submittal</u>	<u>Update and Resubmit</u>
A. Progress	5 days after notice to proceed	Full Schedule - Monthly with pay request. 3 week look ahead - every two weeks

Part 2 – Products (Not Used)

Part 3 – Execution (Not Used)

END OF SECTION

SECTION 01 33 00

SUBMITTALS

Part 1 - General

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Submittal Schedule.
- C. Shop Drawings.
- D. Product Data.
- E. Samples.
- F. Manufacturer's installation instructions.
- G. Manufacturers' certificates.

1.02 RELATED SECTIONS

- A. Section 01 45 00 - Quality Control: Manufacturers' field services and reports.
- B. Section 01 77 00 - Contract Closeout: Contract warranties, bonds, manufacturers' certificates, and closeout submittals.
- C. General Mechanical Provisions – As shown on drawings
- D. Section 26 10 00 - General Electrical Provisions

1.03 SUBMITTAL SCHEDULE

- A. Contractor to furnish Engineer with a list of submittals required by individual specification sections.
- B. Coordinate schedule with Progress Schedule specified in Section 01 32 00 - Progress Schedule.

1.04 SUBMITTAL PROCEDURES

- A. Submittal Format: Electronic and Hard-Copy. Provide Electronic copies of submittal information to the owner's representative and Engineer. One (1) hard-copy of the submittal must be submitted to Engineer with the Electronic copy for the engineer's records. The hard-copy will not be returned.
- B. Submittal formats shall conform with the following requirements:
 - 1. Each hard-copy Submittal package shall be formatted as follows:
 - a. Use three-ring loose leaf binders.
 - b. Provide index referencing specification section and page.
 - c. Tab individual sections.
 - 2. Each Electronic Submittal package shall be formatted as follows:
 - a. The full extent of the submitted data shall be presented in a single electronic file on a CD-ROM.
 - b. File Format Type: Adobe PDF, or universally readable equivalent.
 - c. Scanned information: Minimum 400 dpi.
 - d. Provide index referencing specification section and page.
 - e. Bookmark individual sections.

- f. One file per CD-ROM.
 - 1) Format CD-ROM for use in PC compatible hardware
 - 2) Format CD-ROM so that additional files may be written to it (read-write).
 - C. Transmit one copy of each submittal with Contractors standard transmittal to the Engineer.
 - D. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
 - E. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
 - F. Apply Contractor's stamp, signed or initialed certifying that review, 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.
 - G. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.
 - H. For each submittal, allow 10 days for Engineer's review excluding delivery time to and from the contractor.
 - I. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
 - J. Provide space for Contractor and Engineer review stamps.
 - K. For submittals required to be revised and resubmitted, identify all changes made since previous submission.
 - L. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with provisions.
 - M. Submittals not required in the Project Manual will not be recognized or processed.
- 1.05 SHOP DRAWINGS
- A. Submit in the form of multiple opaque copies. Number required by Contractor, plus three which will be retained by Engineer, Owner, and consultants. At Contractors option submit one reproducible transparency and one opaque reproduction.
 - B. Shop Drawings: Submit for review. After review, produce copies and distribute in accordance with the Submittal Procedures article above and for record documents purposes described in Section 01 77 00 - Contract Closeout.
 - C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- 1.06 PRODUCT DATA
- A. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Engineer.
 - B. Mark each copy to identify applicable products, models, options, and other data required by individual Sections. Supplement manufacturers' standard data to provide information unique to this Project.
 - C. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
 - D. Submit MSDS information for all products for which they are available.

- E. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01 77 00 - Contract Closeout.

1.07 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes from the full range of manufacturers' standard colors, and in custom colors where specified, textures, and patterns for Engineer selection.
- C. Include identification on each sample, with full Project information.
- D. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.
- E. Reviewed samples which may be used in the Work are indicated in individual specification sections.

1.08 MANUFACTURER INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.09 MANUFACTURER CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer to Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.10 SCHEDULE OF SUBMITTALS

- A. Provide as required by individual sections.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

Part 1 - General

1.01 SECTION INCLUDES

- A. Quality assurance - Control of installation.
- B. Tolerances.
- C. Manufacturers' field services and reports.

1.02 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

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

1.04 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer. Notify Engineer of time and date of manufacturer's on-site field service 10 days in advance of service.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Submit report in duplicate within 30 days of observation to Engineer for information.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

Part 1 - General

1.01 DESCRIPTION

- A. Requirements for temporary services and facilities including utility services for construction and support facilities.

1.02 UTILITIES AVAILABILITY TO CONTRACTOR

- A. For the purpose of construction, the Owner will furnish reasonable quantities of water and electricity to the contractor without charge.
- B. The contractor shall be responsible for both temporary utility connections and disconnects, and shall obtain permission of the Owner's Representative prior to accomplishing either.

1.03 TEMPORARY LIGHTING

- A. Provide temporary lighting throughout the construction period as required. Provide 5 foot candles minimum in occupied spaces during presence of authorized personnel and 10 foot candles minimum in areas of construction activity during scheduled work periods. Provide additional lighting for finish work when required.

1.04 TEMPORARY SUPPORT FACILITIES

- A. Temporary Sanitary Facilities
 - 1. Contractor shall provide sanitary facilities in accordance with the following:
 - a. Provide and maintain an adequate number of facilities for the use of persons employed on the Work during construction.
 - b. Provide enclosed, weatherproof facilities with heat as required.
 - c. Use of new or existing Owner's facilities will not be permitted.
- B. Temporary heat and ventilation
 - 1. Minimum Interior Ventilation: Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere at all times. Provide ventilation for materials being cured.
 - 2. Ventilation air must continue to be supplied to those areas outside of the active scheduled work boundary. Protect air intakes for building air systems from dust entry during construction.
- C. Provide lifting devices necessary for the proper and efficient movement of materials; provide operating personnel for equipment as required. Allow use of all hoisting equipment on project during "off-hours" for the cost of the workers involved.

1.05 FIRST AID

- A. Provide required first aid facilities as required by OSHA governing regulations.

1.06 FIRE PROTECTION

- A. Fire Safety: Take precautions to prevent the possibility of fire resulting from construction operations. Particularly avoid hazardous accumulations of rubbish and unsecured flammable materials.
- B. Fire Fighting Equipment: Provide emergency fire extinguishers of adequate type and quantity, properly maintained. Obtain local Fire department approval of emergency fire extinguisher.
- C. Keep the local Fire Department's telephone number prominently displayed.

1.07 CONSTRUCTION AIDS

- A. Provide and maintain temporary stairs, ramps, ladders, walkways, chutes, and material hoists for handling materials and proper execution of Work.
- B. Construct and maintain to requirements of governing agencies. Furnish for safety of public and construction personnel.
- C. Completely remove temporary materials and equipment upon completion of construction.
- D. Repair damage caused by installation of temporary items and restore finishes to specified condition.

1.08 BARRIERS

- A. Provide and maintain barricades around construction operations, as required to protect public, construction personnel, existing facilities and new Work.

1.09 PROTECTION OF WORK AND PROPERTY

- A. Clean, repair, resurface, or restore existing surfaces to their original, or better, condition, or completely replace such surfaces to match existing, where damaged by construction operations.
- B. The Owner will not be responsible for protection of materials or equipment from vandalism or theft. Security is the responsibility of the Contractor.
- C. Protect adjacent new and existing construction, against spillage of materials used in carrying out Work.
- D. Keep and store combustible materials at a reasonable distance from buildings.

1.10 POLLUTION CONTROL

- A. The contractor shall at all times, on a continuous basis, during the course of this contract keep buildings and the adjoining paving and premises free from all waste materials and rubbish caused by his employees and/or his subcontractors.
- B. Burning or burying of rubbish and waste materials on Site is prohibited. Provide dump box for collection of waste materials.
- C. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems is prohibited.

1.11 DISPOSAL AREAS

- A. Disposal: Disposal of all waste materials and building debris waste items caused by the construction, will be off the site and will be the responsibility of the Contractor.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 60 00

MATERIAL AND EQUIPMENT

Part 1 - General

1.01 DESCRIPTION

- A. Section includes general requirements for handling and storage of construction materials.

1.02 JOB CONDITIONS

- A. Manufacturer's Instructions: Make available, for consultation at job site during installation of the specific item, a copy of manufacturer's installation procedure. For those items provided by Owner, obtain manufacturer instructions from Owner.

1.03 MATERIAL AND EQUIPMENT SELECTION

- A. Comply with standards and specifications including: Size, make, type and quality specified, or as approved in writing by the Engineer.
- B. Manufactured and Fabricated products:
 - 1. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - 2. Manufacturer like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - 3. Two or more items of the same kind shall be identical and by the same manufacturer.
 - 4. Provide products suitable for service conditions.
 - 5. Adhere to equipment capacities, sizes and dimensions shown or specified unless variations are specifically approved in writing.
- C. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
- D. Select and install equipment to operate at full capacity without excessive noise or vibration.

1.04 MANUFACTURER'S INSTRUCTIONS

- A. Perform work in accordance with manufacturer's printed installation instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to the Engineer.
- B. Maintain one set of complete instructions at the job site during installation and until completion.
- C. Handle, install, connect clean, condition and adjust products in strict accordance with the manufacturer's printed instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the Engineer for further instructions.
 - 2. Do not proceed with work without clear instructions.

1.05 TRANSPORTATION AND HANDLING

- A. Coordinate product deliveries to avoid work schedule conflicts and/or delays.
- B. Deliver products undamaged, in manufacturers' original containers, with labels intact and legible.
- C. Immediately on delivery, inspect shipments to assure compliance with Contract Documents and approved submittals, and that products are properly protected and undamaged.
- D. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.06 STORAGE AND PROTECTION

- A. Store products in accordance with Manufacturer's Instructions, with seals and labels intact and legible, and in a manner to assure they will remain free from damage or deterioration.
 - 1. Store products subject to damage by the elements in weather-tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - 3. Protect equipment and systems from moisture, chemical, or mechanical damage before and after installation.
 - 4. Protect shafts and bearing housings from rust.
- B. Exterior Storage:
 - 1. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. Provide easy access for inspections of stored products. Make periodic inspections for stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- D. Protection After Installation:
 - 1. Provide substantial coverings to protect installed products from traffic and subsequent construction operations.
 - 2. Plug or cap pipe and conduit openings to prevent the entrance of foreign matter. Remove when no longer needed.

Part 2 - Products

2.01 MATERIALS

- A. All equipment, material, and articles incorporated into the work covered by the contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract, and shall be asbestos free. References in the specifications to equipment, material, articles or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may exercise the option to use any equipment, material, article, or process that, in the judgment of the Engineer, is equal to that named in the specification, unless otherwise specifically provided in this contract.
- B. Furnish items new and free from defects; of size, make, type and quality specified, or equal.
 - 1. When two or more items of same kind are required under work, use items of single manufacturer except where specifically exempted.
- C. Component parts of an assembly need not be the product of a single manufacturer unless otherwise indicated.
- D. Capacities, rating, grades, thicknesses, requirements, and equipment sizes and dimensions shown or specified are minimum unless otherwise indicated.

2.02 PRODUCTS AND EQUIPMENT

- A. Meet detailed requirements indicated in various sections and provide products and equipment suitable for installation shown. Products and equipment not meeting all specified requirements will not be accepted, even though specified by name along with other manufacturer.
- B. Tolerances used in specified rating or testing standards will not be allowed in determining capacities of products and equipment.

- C. The Drawings are based upon one of the specified manufacturers listed for each particular product or equipment item.
 - 1. The other specified manufacturers and other acceptable manufacturers of products and equipment may require deviations from the drawings to properly install the particular item in accord with manufacturer's recommendations and to provide the results required.
 - 2. Under this Contract provide all work essential to install this equipment at not change in Contract amount and provide shop drawings for review showing deviations required for installation of specific equipment item.

- D. Electrical Products:
 - 1. The Contractor shall submit proof that the items which he proposes to furnish under this specification conform to the standard of Underwriters' Laboratories (UL) and/or Canadian Standards Association (CSA). The label of UL and/or CSA shall be accepted as conforming to this requirement.

Part 3 - Execution

3.01 PREPARATION

- A. Inspect existing conditions, project requirements and Contract Documents.
- B. Verify that materials and equipment furnished meet specified requirements.
- C. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by the Contract Documents.

3.02 INSTALLATION

- A. Install work in neat and workmanlike manner of highest quality for nature of work performed.
- B. Perform the work, handle, install, connect, clean, condition, and adjust products in strict accordance with manufacturer's printed instructions and with Contract Document requirements.
- C. In case of conflict, Contract Documents shall govern. When in doubt, request clarification.

END OF SECTION

SECTION 01 73 00

CUTTING AND PATCHING

Part 1 - General

1.01 DESCRIPTION

- A. Execute cutting, and fitting of Work required to:
 - 1. Uncover Work to provide for installation of ill-timed Work.
 - 2. Remove and repair defective Work.
 - 3. Remove and replace Work not conforming to requirements of Contract Documents.
 - 4. Install specified Work in existing construction.
- B. In addition to Contract requirements, upon written instruction of Owner.
 - 1. Uncover Work to provide for Engineer's observation of covered Work.
 - 2. Remove samples of installed materials for testing.
 - 3. Remove Work to provide for alteration of existing Work.
- C. Do not endanger any Work or any existing construction through cutting or altering Work or any part of it. Do not cut or alter Work of another contractor without written consent of Owner.

1.02 SUBMITTALS

- A. Cutting of building structural elements is prohibited.
- B. Prior to cutting being done, if outside the original scope of Work, submit cost estimate.
- C. Should conditions of Work or schedule indicate change of materials or methods submit written recommendations to Engineer including conditions indicating change, recommendations for alternative materials or methods and submittals as required for substitutions.
- D. Submit written notice to the Engineer designating time Work will be uncovered to provide for observation.

1.03 PAYMENT FOR COSTS

- A. Cost caused by ill-timed or defective Work, or Work not conforming to Contract Documents including costs for additional services of Engineer shall be borne by the party responsible for the deficiency.

Part 2 - Products

2.01 MATERIALS

- A. For replacement of Work removed, comply with pertinent specification sections for type of Work to be done.

Part 3 - Execution

3.01 INSPECTION

- A. Inspect existing conditions of Work including elements subject to movement or damage during cutting and patching.
- B. After uncovering Work, inspect conditions affecting installation of new products.

3.02 PREPARATION

- A. Prior to cutting provide shoring, bracing and support as required to maintain integrity of the element and surrounding elements.
- B. Provide protection for elements for other portions of Project.

3.03 PERFORMANCE

- A. Execute fitting and adjustment of products to provide finished installation conforming with specified tolerances.
- B. Execute cutting and demolition by methods which will prevent damage to other Work and provide proper surfaces to receive installation of repairs and new Work.
- C. Restore Work which has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.
- D. Refinish entire surface as necessary to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersections.
 - 2. Refinish assemblies in entirety.

END OF SECTION

SECTION 01 74 00

CLEANING

Part 1 - General

1.01 PROTECTION OF FINISHES

- A. The various materials, work, equipment, and finishes provided by the trades are all to be protected from other operations or work such that all items are in perfect condition at the time project is turned over to the Owners. The final responsibility for this protection rests with the Contractor, even though various Sections of Specifications may contain specific comments or precautions about protection.

1.02 PREMISES

- A. The Contractor shall at all times during the course of this contract keep the building, the Owner's premises and the adjoining premises, including streets and other areas assigned to Contractor, free from accumulations of waste materials and rubbish caused by the Contractor's employees or subcontractors. See also section 01 50 00 for additional requirements.

1.03 FINAL CLEANING

- A. At completion of the work, or prior thereto if so directed, the Contractor shall remove from the buildings and/or the premises all of the Contractor's tools, appliances, surplus materials, debris, temporary structures, temporary construction for which he has been responsible and/or rubbish, and shall be responsible for clean-up of the work under this contract as well as work under other contracts affected by this work. Cleaning, sealing and all other such finish operations noted on the Drawings or required in the Specifications shall be taken to indicate the required condition at the time of acceptance of work under the Contract.
- B. At completion of work, the Contractor shall sweep, dust and clean thoroughly all surfaces. All marks, stains, fingerprints, dust, dirt paint, drippings, and the like shall be removed throughout the building. All equipment and paint work shall be cleaned and touched up if necessary and all temporary labels, tape, and paper coverings shall be removed, all to the approval of the Owner and Engineer. Final acceptance of this facility is dependent upon final cleaning being complete.
- C. If the Contractor, upon request by the Owner, does not attend to such cleaning with reasonable promptness, the Owner may cause such cleaning to be done by others and charge the cost of the same to the Contractor or deduct the cost from payments still due the Contractor under the Contract.
- D. Maintain in cleaned condition until final acceptance.

Part 2 - Products

2.01 MATERIALS

- A. Cleaning agents, implements, and methods used for the cleaning, polishing or sealing of any surface shall be products recommended and approved by the manufacturer of the item or surface to be cleaned. The Contractor shall be fully responsible for any damage to any surface or substrate caused by the improper use of cleaning materials.

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

Part 1 - General

1.01 SUBSTANTIAL COMPLETION

- A. Submit written Notice to the Engineer that work, or designated portion thereof, is substantially complete for each phase of construction.
 - 1. Submit list of major items remaining to be completed or corrected.
 - 2. The Project will not be substantially complete unless all cleaning is complete and in accordance with the Contract Documents. See Section 01 74 00.
- B. Engineer will inspect Work within 3 days.
- C. If Engineer determines Work to be substantially complete:
 - 1. Engineer will prepare a tentative list of items to be completed or corrected.
 - 2. Engineer will submit the tentative list to the contractor for written acceptance and correction of the deficiencies.
 - 3. Engineer will prepare and issue a Certificate of Substantial Completion, AIA G704.
 - 4. Owner may occupy Project, or designated portion of Project, under provisions of Certificate of Substantial Completion.
- D. If Engineer determines that work is not substantially complete, he will immediately notify Contractor in writing. Contractor shall complete work and submit a second written notice of substantial completion to the Engineer. The Engineer will reinspect the work.

1.02 FINAL INSPECTION

- A. Submit written certificate that Contract Documents have been reviewed, project has been inspected, work is completed in accordance with Contract Documents, equipment and systems have been tested in the presence of the Owner Representative and are operational and work is ready for final inspection at the conclusion of each phase. Engineer will inspect work within 3 days.
- B. Should Engineer consider that the work is incomplete or defective, he will notify contractor in writing, listing the incomplete or defective work. Contractor shall remedy the deficiencies and send a second written certification to Contracting Officer that the work is complete. Engineer will reinspect the work.
- C. When the Engineer finds that work is acceptable under the contract Documents, he shall request the Contractor to make closeout submittals.

1.03 REINSPECTION FEES

- A. All costs for any additional inspections following the first inspection for Substantial Completion and for Final Inspection shall be the responsibility of the Contractor, and all costs, including those costs incurred by the Owner and the Engineer shall be deducted from the Contractor's final payment.

1.04 CONTRACT COMPLETION

- A. Contractor will insure that the project is complete to include final inspection and acceptance by the Owner prior to the scheduled completion date.

1.05 PROJECT RECORD DOCUMENTS

- A. In accordance with Section 01 77 50.

1.06 CLOSEOUT MANUALS

- A. Form of Manuals:
 - 1. Prepared data in the form of instruction manuals for use by the owner. Use 8½"x11" manual format in 3 ring binder. Provide four (4) complete sets.
 - 2. Include drawings, indexed tabs and title for each manual.
- B. Content of Manuals:
 - 1. List products, equipment and systems used in the Project. List project installers, maintenance program and local source of supply for replacement parts.
 - 2. Include product data with specific product clearly identified.
 - 3. Include drawings of control diagrams, flow diagrams and system relationships.
 - 4. Include above data for Owner provided products.
- C. Materials and Finishes Manual:
 - 1. Product information on all finish materials.
 - 2. Paint numbers.
 - 3. Locations of paint finishes.
- D. Equipment and System Manual:
 - 1. Include manufacturer's description, operating characteristics, performance data, and printed operating and maintenance instructions.
 - 2. Include manufacturers' catalog number and replaceable parts list.
 - 3. Include start-up, break-in, operating instructions, control, stopping, shut-down, emergency instructions, and operating sequence.
 - 4. Include copies of approval for City final building permit inspections and Certificate of Occupancy, if applicable.
 - 5. Include as-installed color coded piping diagrams and list of piping identification markers.
 - 6. Include circuit directories of panel boards and as-installed color coded wiring diagrams.
 - 7. Include valve tag directory listing tag number, location, service, size, manufacturer, model number and normal position.
 - 8. Include name plate directory listing equipment designation, name plate data, location of equipment, location of switch and normal position of switch.
- E. Warranties and Bonds Manual:
 - 1. Assemble warranties, bonds and service and maintenance contracts, executed by each manufacturer, supplier and subcontractor.
 - 2. Include table of contents, beginning date and duration of warranty, bond or service contract, and party to contract in case of claim against warranty.
- F. Spare Parts and Maintenance Materials Manual:
 - 1. Tabulate list of spare parts and maintenance materials showing product description, paragraph in Project Manual listing product and quantity delivered to the Owner.

1.07 INSTRUCTION OF OPERATING PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct Owner's designated personnel in the operation, adjustment and maintenance of all products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
 - 1. Review contents of manual with Owner's personnel in full detail to explain all aspects of operations and maintenance.

1.08 MAINTENANCE MATERIAL HANDLING

- A. Label packages and deliver spare parts and maintenance materials to Owner's storage area. Submit quantity specified in each product section.

1.09 SCHEDULE OF CLOSEOUT SUBMITTALS

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 - 1. AIA Document G706 Contractor's Affidavit of Payment of Debts and Claims.
 - 2. AIA Document G706A Contractor's Affidavit of Release of Liens.
 - 3. AIA Document G707 Consent of Surety Company to Final Payment.
 - 4. Operation and Maintenance Manuals.
 - 5. Warranties and Bonds. Submit original documents, including Contractor's General Warranty.
 - 6. Record Documents
 - 7. Keys.
 - 8. Proof of final acceptance and compliance from governing authorities having jurisdiction.
- B. Provide electronic copies of closeout submittals, as applicable, in accordance with Section 01 33 00.
- C. Certificate of Completion:
 - 1. Obtain and Submit Certificate of Completion and schedule date for warranty inspection.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 77 50

RECORD DOCUMENTS

Part 1 - General

1.01 DESCRIPTION

- A. Project document maintenance procedures.

1.02 MAINTENANCE OF DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 - 1. Bid Documents
 - 2. Contract Forms
 - 3. Project manual
 - 4. Contract Drawings
 - 5. Addenda
 - 6. Change Orders and other modifications to the Contract
 - 7. Reviewed Shop Drawings, Product Data, and Samples
 - 8. Office Samples
 - 9. Field Test Records
 - 10. Engineer's Supplemental Instructions
 - 11. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.

1.03 HANDLING AND RECORDING

- A. Store documents and samples in Contractor's field office separate from documents used for construction. Ensure entries are complete and accurate, enabling future reference by Owner. Provide felt tip marking pens, maintaining separate colors for each major system, for recording information.
- B. Keep current record of documents and label each document "Project Record". Information shall be correct, accurate, neat, and finished in appearance. Recorded field data shall show accurate dimensions vertical and horizontal for location of concealed items, utility lines, recording field changes of dimensions, and changes in materials furnished on project record documents. Record changes from Engineer's Supplemental Instruction, change orders and details not on contract drawings. Store record documents separately from documents used for construction.
- C. Information shall be recorded concurrently with construction progress. Record documents shall not be more than 7 days behind construction progress. Deliver to Engineer for review and approval with request for final payment. Meet with the Engineer to review field recorded information. Final payment will not be authorized until acceptance of field recorded data by the Engineer and Owner.
- D. Project record documents will be reviewed twice monthly. Review of updated project record documents will be part of approval by the Owner's representative on a twice monthly basis of the Contractor's application for payment and failure to have project record documents updated will delay payment.
- E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.

- F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 2. Field changes of dimension and detail.
 - 3. Details not on original Contract drawings.

1.04 SUBMITTAL

- A. Format:
 - 1. Identify and date each Record Drawing, including the designation "Project Record Drawing" on each sheet.
 - 2. Organize Record Drawings in order of construction documents sets, and bind together.
- B. Provide scanned electronic copies of Record Drawings on CD-ROM, with format per Submittal Procedures in Section 01 33 00.
- C. Provide three (3) hard copies of record drawings. Two (2) copies for Owner's records, one (1) copy for engineer's records.
- D. Provide two (2) copies of record drawing files in PDF and CAD format (including layer Index) on CD-ROM.
- E. Submit documents to Engineer prior to submittal of final Application for Payment.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 78 00

OPERATION AND MAINTENANCE DATA

Part 1 - General

1.01 QUALITY ASSURANCE

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.02 FORMAT

- A. Prepare data in the form of an instructional manual. Refer to Section 20 20 00 for specific format requirements.

1.03 CONTENTS, GENERAL, EACH VOLUME

- A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, Sub-consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. 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.
- E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 60 00.
- F. Warranties: Bind in copy of each. As specified in Section 01 77 00.

1.04 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured Products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual Product specification sections.
- E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.05 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Refer to section 26 10 00 and individual Divisions 20, 23 and 26 specification sections for Manual content related to equipment and systems.

1.06 INSTRUCTION OF OWNER PERSONNEL

- A. Before final completion, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.07 SUBMITTALS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before 75% Pay Request. Engineer will review draft and return one copy with comments.
- B. Submit 1 copy of completed volumes 15 days prior to final completion. This copy will be reviewed and returned after final inspection, with Engineer's comments. Revise content of all document sets as required prior to final submission.
- C. Submit three (3) hard-copy binder sets and two (2) CD-ROM disks with searchable PDFs in final form within 30 days after final inspection. Two (2) hard copies and one (1) CD-ROM for Owner's representative. Electronic file format shall be organized with individual sections in accordance with submittal requirements listed in Section 01 33 00.

1.08 SCHEDULE OF SUBMITTALS

- A. Provide as required by individual sections.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 01 79 00

WARRANTIES

Part 1 - General

1.01 SECTION INCLUDES

- A. Preparation and Submittal.
- B. Time and Schedule of Submittals.

1.02 FORM OF SUBMITTALS

- A. Bind in commercial quality 8-1/2 x 11 inch three D side ring binders with durable plastic covers.
- B. Cover: Identify each binder with typed or printed title, "WARRANTIES AND BONDS", with title of Project; name, address and telephone number of Contractor; and name of responsible company principal.
- C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or Work item.
- D. Separate each extended correction period warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.03 PREPARATION OF SUBMITTALS

- A. Obtain extended correction period warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten 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.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
- B. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
- C. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.05 SCHEDULE OF WARRANTIES

- A. The following warranties are an extension of the one-year warranty called for in the General Conditions. The Owner reserves the right to make temporary or emergency repairs as necessary to maintain Products without voiding specified warranties nor relieving Contractor of responsibility during warranty periods.

Description

Duration

Mechanical:

As specified in Mechanical Divisions

Electrical Work:

As specified in Electrical Divisions

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 02 75 00

CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
 - 1. Exterior Concrete Pad.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.3 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
- C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- E. Mockups: None required

1.5 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves with a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Epoxy-Coated Welded Wire Fabric: ASTM A 884/A 884M, Class A, plain steel.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- D. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.
- E. Plain Steel Wire: ASTM A 82.
- F. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, plain.
- G. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- H. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60, plain steel bars.
- I. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- J. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

- K. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
 - 1. Portland Cement: ASTM C 150, Type I or II
 - a. Fly Ash: ASTM C 618, Class C.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494 Type A.
 - 2. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 3. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

2.4 FIBER REINFORCEMENT

- A. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.
- D. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94 and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
 - 3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
 - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 - 2. Provide tie bars at sides of pavement strips where indicated.
 - 3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a [1/4-inch] [3/8-inch] radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site.
- F. Do not add water to fresh concrete after testing.

- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- J. Screed pavement surfaces with a straightedge and strike off.
- K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- L. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- M. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- N. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- O. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- C. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4 inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 - 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 1/2 inch.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. Yd or fraction thereof of each concrete mix placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39; test 1 specimen at 7 days and 2 specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days,

concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 02 82 00
FENCES AND GATES

PART 1 – GENERAL

1.01 EXTENT OF WORK

Provide chainlink fences with vinyl slats at the work area shown on the Drawings including but not limited to

A. Chainlink fencing with vinyl slats, end and intermediate posts, gates

B. Concrete footings for end and intermediate posts.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Concrete Paving 02 75 00

1.03 SHOP DRAWINGS

Show data, layout, sizes, connections, details and installation methods, attachments and anchoring of all manufactured and fabricated items.

1.04 BUILDING CODES AND GENERAL REQUIREMENTS

All work in accordance with International Building Code, all structural steel shall be ASTM A-36 detailed, fabricated in accordance with AISC Manual - 8th edition. All welding by certified welders in accordance with minimum AWS Specifications.

1.05 SHOP TREATMENTS

N/A

1.06 BOLTS, FASTENERS, AND WORK HARDWARE

Items fabricated and noted shall be provided complete with bolts, fasteners and hardware for a complete installation.

1.07 COORDINATION

Embedded items and items for attachment to other trades, coordinate with trades involved. Provide templates where required for embedded items or installation by other trades.

1.08 DELIVERY, STORAGE AND HANDLING

Protect against damage to item or finish. Coordinate other trades affecting and affected by work in this section. Protect other work against damage and discoloration caused by work in this section.

1.10 QUALITY ASSURANCE

A. Fabricator Qualifications

Firm experience in successful fabrication and installation of chainlink fencing and gates similar to that required for this project.

PART 2 - PRODUCTS

2.01 GENERAL

Chainlink fabric: 9 gauge aluminum coated ASTM –A491 Grade 45 with 2" mesh x height shown on drawings. Terminal end and intermediate posts: 3 ½" x 3 ½" hot dipped zinc ASTM A123 galvanized standard weight.

Vertical vision slats: Brown plastic slats to match existing standard with Master Halco or approved.

PART 3 – EXECUTION

3.01 EXISTING CONDITIONS

Verify correct location, position, alignment of surfaces to receive fencing and gate system. Start of work denotes acceptance of surface. Verify dimensions by field measurements prior to fabrication. If field measurements vary slightly from Drawing dimensions, modify work as required for accurate fit. If measurements vary substantially, notify Architect prior to fabrication.

3.02 INSTALLATION

Install fencing posts and fencing fabric plumb, square, level, as required for rigidity, permanence..

3.03 CLEANING AND REPAIRING

Clean, repair and touch-up or replace when directed, materials including those of other trades which have been soiled, damaged or discolored by work in this section.. Remove debris from site upon completion of this work, or sooner if directed.

END SECTION

SECTION 07 62 00

SHEETMETAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 CONTRACT CONDITIONS

- A. Work of this Section is bound by the Contract Conditions and Division 1, bound herewith, in addition to this Specification and accompanying Drawings.

1.2 FIELD MEASUREMENTS

- A. Verify prior to fabrication.
- B. If field measurements differ slightly from Drawing dimensions modify Work as required for accurate fit. If measurements differ substantially, notify Architect prior to fabrication.

1.3 MAINTENANCE WARRANTY

- A. Warrant Sheetmetal Flashing and Trim to be weatherproof for 2 years following Project Substantial Completion date, and repair or replace without additional cost to Owner any water leaks and resulting damage to Building Materials and/or Building Contents as may occur under normal usage within Warranty Period.
- B. Warrant for 20 years following Project Substantial Completion that Factory-applied Enamel Coatings on Sheetmetal will not fade, chalk, craze, chip, crack, peel, delaminate, or otherwise deteriorate.

PART 2 - PRODUCTS

2.1 GALVANIZED STEEL SHEETS

- A. Where Exposed to Ground Level View:
 - 1. Metal Manufacturing Standards: ASTM A-653
 - 2. Minimum Coating Designation: G-90
 - 3. Pattern: Smooth without texture
 - 4. Minimum Metal Thickness: Specified below
- B. Finish:
 - a. Fluoropolymer Enamel with 70% minimum PVDF content
 - b. Minimum Dry Film Thickness: 1 mil
- C. Color: Selected by Architect after Contract award from Manufacturer's standard choices.
Manufacturing Standard: ASTM A-653
- D. Where Concealed from View:
- E. Quality: Lock-forming.
- F. Minimum Metal Thickness: Specified below
- G. Minimum Coating Designation: G-9
- H. Pattern: Smooth without texture

2.2 NAILS

- A. Manufacturing Standard: Fed. Spec. FF-N-105B

- B. Type: Barbed, slating.
- C. Head: Flat
- D. Material: Hot-dip Galvanized Steel Wire
- E. Minimum Length: 1 inch

2.3 SCREWS

- A. Manufacturing Standard: Fed. Spec. FF-S-107
- B. Type: Self-tapping
- C. Head: Pan
- D. Material: Cadmium-plated Steel Match Sheetmetal where exposed, Cadmium-plated Steel elsewhere.

2.4 SEALANT

- A. Manufacturer & Brand: Dow 999-A, GE Silicone II, Mameco Vulkem 116, Ruscoe Permanent Sealer, Sonneborn NP-1, Tremco Gutter Seal, or approved.

2.5 PRIME COATING & UNDERCOATING

- A. Material: For Galvanized Steel: Galvanized Primer specified in Section 09900

2.6 ASPHALT COATING COMPOUND

- A. Manufacturing Standard: Fed. Spec. TT-C-494
- B. Type: II

2.7 FABRICATION

- A. General:
 - 1. Form to shapes and dimensions shown with planes and lines in true alignment.
 - 2. Unless otherwise shown on Drawings or specified, fabricate with longest practicable lengths.
 - 3. Form Openings Head and Sill Flashing with End Dams.
 - 4. Hem exposed edges.
 - 5. Angle bottom edges of vertical surfaces to form drip.
- B. Seams:
 - 1. Lap Seams: 3 inch finish width.
 - 2. Solder-Lap Seams: 1 inch finish width; sweat full with Solder.
 - 3. Standing Seams: 1 inch finish height; 5-ply double locked.
- C. Through-Wall Flashing:
 - 1. Form with 3/16 inch high Raised Ribs running perpendicular to Flashing length and spaced at 3 inch centers throughout Flashing length.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

- A. Verify that Surfaces to receive Sheetmetal are smooth, clean, and otherwise properly prepared.
- B. Prior to starting Work notify General Contractor of defects that require correction.
- C. Do not start Work until conditions are satisfactory.

3.2 PROTECTING WORK OF OTHER SECTIONS

- A. Protect against damage and discoloration caused by Work of this Section.

3.3 INSTALLATION, GENERAL

- A. Install Work watertight, without waves, warps, buckles, tool marks, fastening stresses, distortion, or defects which impair strength or mar appearance.
- B. Install planes and lines in true alignment.
- C. Allow for Sheetmetal expansion and contraction.

3.4 SOLDERING

- A. Clean and flux Metals prior to soldering.
- B. Sweat Solder completely through Seam widths.

3.5 WELDING

- A. Follow Sheetmetal Manufacturer's recommendations.

3.6 SEALANT INSTALLATION

- A. Apply 1/4 inch diameter Bead, centered in full length of Joint.

3.7 COUNTER FLASHING

- A. Form of 16 oz. psy (0.0204 inch thick) Copper. 24 ga. Galvanized Steel.
- B. Overlap Base Flashing 4 inches minimum.
- C. Install Bottom Edge spring-tight against Base Flashing, or at Contractor's option secure Bottom Edge with 1 inch wide Clips spaced no greater than 24 inch o.c. Attach Clips to Substrate with concealed Fasteners. Reinforce Clips by double-bending Clip 3/4 inch back over bottom edge of Counter Flashing.
- D. Lap-seam Vertical Joints, and apply Sealant.
- D. Miter, Lap-seam, and close Corner Joints with Solder.
- E. Provide where Roof intersects Vertical Surfaces, and elsewhere shown on Drawings.

3.8 ROOF PENETRATION FLASHING

- A. General:
 - 1. Form of 24 ga. Galvanized Steel.
- B. Base Flashing:
 - 1. Extend Flange onto Roof 8 inches minimum in all directions away from Penetration and upward around Penetration to position at least 2 inches above Roof surface.
 - 2. At Sheetmetal Roofing fold upper and side edges at least 1/2 inch back over Flange.
 - 3. Solder-lap Joints.
 - 4. Furnish to Roofer for installation.
- C. Counter Flashing:
 - 1. Overlap Base Flashing at least 1 inch with Storm Collar sloped away from Penetration.
 - 2. Secure to Penetration with Solder or with Draw Band and Sealant.

3.9 CLEANING & REPAIRING

- A. As Work progresses, neutralize excess flux with 5% to 10% Washing Soda Solution, and thoroughly rinse.
- B. Including Work of other Sections, clean, repair and touch-up, or replace when directed, Products which have been soiled, discolored, or damaged by Work of this Section.
- C. Leave non-factory-painted surfaces ready for Field Painting specified in Section 09900.
- D. Remove Debris from Project Site upon Work completion, or sooner if directed.

END OF SECTION

SECTION 07 84 00

FIRE STOPPING

Part 1 - General

1.01 RELATED SECTIONS

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

1.02 SUMMARY

- A. Section includes requirements for through-penetration fire stopping for items including piping, ductwork, wiring and conduit provided under the Contract.
- B. Section also includes requirements for recessing equipment, cabinets, or devices in fire rated walls, ceilings, and floors.
- C. Products shall be of a single manufacturer for each type of fire stopping required, and where several types are integrated into a single assembly. Provide putty, sealants, wraps, boards, and accessories as necessary and required for the work of this project.

1.03 REFERENCES

- A. Underwriters Laboratories:
 - 1. UL Fire Resistance Directory.
 - 2. UL Component Listing Test Criteria.
 - 3. Warnock Hersey.
- B. American Society For Testing And Materials Standards:
 - 1. ASTM E 814 - 88: Standard Test Method For Fire Tests of Through-Penetration Firestops.
- C. International Building Code, 2009, with Oregon Amendments (Oregon Structural Specialty Code, OSSC, 2010) – Chapter 7 Fire Resistance Rated Construction.

1.04 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to a given type of construction.
- B. Barriers: Time rated fire walls, ceiling/floor assemblies, and structural floors.
- C. Fire Stopping: Assembly of materials applied at penetrations to limit spread of heat, fire, gases and smoke.
- D. Penetration: Opening through or into a barrier such that full thickness of rated materials is not obtained.
- E. System: Specific products and applications, classified and numbered by Underwriters Laboratories (UL), Inc. to close specific barrier penetrations.
- F. F Rating: Time period that fire stop assembly can withstand fire and hose stream test as determined in UBC Standard 7-5.
- G. T Rating: As required for F Rating and to limit temperature rise above the initial temperature to 325 degrees F on protected side as determined in UBC Standard 7-5.

1.05 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Provide manufacturer's installation drawings and instructions for each proposed assembly. Identify intended product and applicable UL System number or UL classified devices.

- B. Provide manufacturer recommendations and drawings relating to non-standard applications where necessary.

1.06 QUALITY ASSURANCE

- A. Installer Qualification: Acceptable to, or certified by, Fire Stopping system manufacturer.
- B. Regulatory Requirement: Contractor shall verify acceptance from Authority Having Jurisdiction for proposed assemblies conforming to, or not conforming to, specific UL Fire Stop System Numbers, or UL classified devices.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in original, unopened packaging with legible manufacturer's identification. Store materials in accordance with manufacturer's instructions. Store in clean, dry, ventilated location, protected from freezing.

1.08 WARRANTY

- A. Submit copies of written warranty for Fire Stopping assemblies. Warranty period shall be one year minimum.

Part 2 - Products

2.01 GENERAL

- A. Fire Stop products and accessories shall be asbestos-free, intumesce when exposed to temperatures of 250 degrees F, and maintain an effective barrier against flame, smoke and gases. Mortar systems must be Warnock Hersey approved.
- B. Fire Stop Fire Rating: Not less than rating of barrier penetrated in which fire stopping will be installed.

2.02 FIRE STOPPING ASSEMBLIES

- A. Assemblies of materials used to seal spaces around penetrations shall have a UL Fire Stop System Number appropriate for the construction type, penetration type, annular space requirements, and fire rating at each penetration.
- B. Systems and devices must withstand the passage of cold smoke either as an inherent property of the system or by the use of a separate product included as a part of the UL system or device and designed to perform this function. Systems complying with the requirements for through-penetration firestopping in fire-rated construction are acceptable provided the system will provide a smoke seal.
- C. Performance Requirements: Fire Stop assembly shall be able to withstand standard fire and hose stream test (F Rating) and limit temperature rise (T Rating) of penetrans on protected side as required by Authorities Having Jurisdiction. Conform to UBC Standard 7-5.
- D. Manufacturers: 3M, Dow, Chase Technology Corp., Bio Fireshield Inc., ProSet, Johns Manville, Specified Technologies Inc, Metacaulk, GS Hevi-Duti/Nelson, or approved.

2.03 ACCESSORIES

- A. Fill, void, or cavity materials: As classified under category XHHW in the UL Fire Resistance Directory.
- B. Forming materials: As classified under category XHKU in the UL Fire Resistance Directory.

Part 3 - Execution

3.01 GENERAL

- A. Provide Fire Stopping seal at piping, ductwork, wiring, or conduit penetration, installed under this Contract, through fire rated construction.
- B. Provide fire rated assembly around equipment, cabinets, devices and/or appurtenances recessed in fire rated walls and ceilings.
- C. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
- D. Provide masking and drop cloths to prevent contamination of adjacent surfaces by Fire Stopping materials. Clean spills of liquid components. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- E. Clean surfaces to be in contact with penetration seal materials of dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting, adhesion, or the required fire resistance. Cut and trim materials as required to neatly match edges of penetration.
- F. Comply with manufacturer's recommendations for temperature and humidity conditions before, during, and after installation of Fire Stopping.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

Part 1 - General

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints and other coatings.
- C. Scope: Reference Section 14 21 10.
- 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. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 3. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2008.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Before ordering, provide data on all finishing products and special coatings. Provide MSDS sheets on all materials used on the project.
- C. Samples: Submit two painted draw-down samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on stiff paper, 8 x 12 inch in size.
- 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.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 - a. Label each container with color in addition to the manufacturer's label.
 - 2. Draw downs and final list/matrix of all finish paint.

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 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.

1.06 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.

1.07 WARRANTY

- A. Provide manufacturer's standard 10 year warranty of exterior elastomeric paint systems.

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. Paints:
 1. Benjamin Moore & Co: www.benjaminmoore.com.
 2. Miller Paint Co: millerpaint.com
- C. 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. Supply each coating material in quantity required to complete entire project's work from a single production run.
 3. 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. Volatile Organic Compound (VOC) Content:
 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS - INTERIOR

- A. Interior Acrylic Enamel: Factory-formulated acrylic-latex enamel for interior application.
 1. 1 coat

- B. Interior Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.
 - 1. 2 coats
 - 2. Reference Section 14 21 10 for colors

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.

Part 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to 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. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. 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.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Provide adequate fresh air and ventilation during application.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Allow manufacturer's specified drying time and ensure correct coating adhesion for each coat before applying next color.
- F. Inspect each coat before applying next coat; touch up surface imperfections with coating material, feathering and sanding of required; touch up areas to achieve flat uniform surface without surface defects visible from 5 feet.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.

- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Where coating application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.
- J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. Do not cover or paint any signs, labels, identification, etc. If covered or painted, the contractor is required to replace items.
- B. Contractor must redo unsatisfactory finishes; refinish area to corners or other natural terminations.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

END OF SECTION

SECTION 20 10 00

GENERAL MECHANICAL PROVISIONS

Part 1 - General

1.01 CONTRACT CONDITIONS

- A. Work of this Division is bound by the Provisions of Division 1 bound herewith, in addition to these Specifications and accompanying Drawings.
- B. Work of this Division shall conform to published installation and materials standards of the University of Oregon specifically applicable to Divisions 20, 21, 22 and 23, available online at <http://campusops.uoregon.edu/cc/cc-standards>, which are incorporated herein by reference.

1.02 SECTION INCLUDES

- A. General requirements specifically applicable to Division 20, 21, 22 and 23 sections, which apply in addition to Division 1 Requirements.

1.03 DRAWINGS AND SPECIFICATIONS

- A. The Drawings and Specifications are complimentary, and what is called for by one shall be as binding as if called for by both.
- B. Use of the word "Provide" shall be equivalent to "Furnish and Install."
- C. Use of singular or plural in article, paragraph, and subparagraph headings does not indicate numbers of products required. Example: The heading "Chiller" does not necessarily mean there is only one chiller required.
- D. Abbreviations:
 - 1. ADA: Americans with Disabilities Act
 - 2. AASHTO: American Association of State Highway and Transportation Officials
 - 3. ASTM: American Society for Testing and Materials
 - 4. AWWA: American Water Works Association
 - 5. ANSI: American National Standards Institute
 - 6. NEMA: National Electrical Manufacturers' Association
 - 7. ASME: American Society of Mechanical Engineers
 - 8. UL: Underwriters' Laboratories
 - 9. IAPMO: International Association of Plumbing and Mechanical Officials
 - 10. Fed. Spec.: Federal Specifications
 - 11. MSS: Manufacturers' Standardization Society of the Valve and Fitting Industry
 - 12. WOG: Non-shock Water-Oil-Gas maximum working pressure rating
 - 13. NFPA: National Fire Prevention Association
 - 14. FM: Factory Mutual
 - 15. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association
 - 16. ARI: Air Conditioning and Refrigeration Institute
 - 17. AMCA: Air Movement and Control Association
 - 18. TIMA: Thermal Insulation Manufacturers' Association
 - 19. ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers
 - 20. AABC: Associated Air Balance Council
 - 21. NEBB: National Environmental Balancing Bureau
- E. For products specified by listing one or more manufacturers, followed by "Similar to" and one manufacturer's model number, the following requirements apply:
 - 1. Approval of each listed manufacturer is contingent upon that manufacturer having a product which meets the specification, fits the available space, and is comparable to the listed model.
 - 2. Electrical requirements, duct connections, pipe connections, and space requirements indicated on Drawings are based on the listed model. Provide revisions required to accommodate the model actually furnished.

- F. For products specified by listing one or more manufacturers, followed by a model number for each manufacturer, the following requirements apply:
 - 1. Provide one of the listed model numbers or an approved substitution.
 - 2. Electrical requirements, duct connections, pipe connections, and space requirements indicated on Drawings are based on one of the listed models, and may not be suitable for all models listed. Provide revisions required to accommodate the model actually furnished.

1.04 PERMITS, FEES, AND GOVERNING AGENCIES

- A. Obtain permits and pay fees required by governing agencies.
- B. Minimum requirements not otherwise stated herein shall meet governing codes and standards.
- C. Arrange and pay for inspections and tests required by applicable codes and ordinances.

1.05 SITE VISITATION AND FIELD MEASUREMENTS

- A. Examine site of proposed Work to verify conditions. Beginning of Work means acceptance of conditions.
- B. If conditions differ substantially from conditions indicated on Drawings, notify Architect before commencing Work.

1.06 SUBSTITUTIONS

- A. Substitution requests will not be considered unless they are submitted in writing, in accordance with Division 0 and Division 1.
- B. Substitution requests will not be considered unless they include the following:
 - 1. Model numbers of proposed substitutions.
 - 2. Options that are required to make the proposed substitution comply with Specifications.
 - 3. Summary of modifications of the Work that are required to accommodate the proposed substitution.

1.07 OWNER FURNISHED ITEMS

- A. Refer to Division 1.

1.08 ALTERNATES

- A. Refer to Division 1.

1.09 PROJECT MANAGEMENT AND COORDINATION

- A. General: Provide Work to coordinate mechanical, electric and plumbing effort with the work of other Divisions.
- B. Project Management and Coordination:
 - 1. Provide coordination for the Work of Divisions 20, 21, 22 and 23 in accordance with Division 1.
 - 2. Locations shown on Drawings are approximate and are not intended to fully coordinate the Work of all Sections. Plan exact locations based on field measurements of field conditions and the Work of other Sections.
 - 3. Drawings do not show all required duct and pipe offsets and fittings. Provide offsets and fittings as required to coordinate with the Work of other Sections and with field conditions.
 - 4. Locate equipment, piping, valves, dampers, etc. to provide adequate space for normal operating and maintenance activities.

1.10 CUTTING AND PATCHING

- A. Provide cutting and patching for the Work of Divisions 20, 21, 22 and 23 in accordance with Division 1.

1.11 SHOP DRAWINGS AND PRODUCT DATA

- A. Provide shop drawings and product data for the Work of Divisions 20, 21, 22 and 23 in accordance with Division 1. Refer to each Section for required shop drawings and product data submittals.
- B. Acceptable Submittal Formats: Hard-Copy, or Electronic. If Electronic format is selected, at least one Hard-Copy of the information must be submitted with the Electronic copies to the Engineer (the Hard-Copy will not be returned).
- C. Submittal formats shall conform with the following requirements:
 - 1. Each hard-copy Submittal package shall be formatted as follows:
 - a. Use three-ring loose leaf binders.
 - b. Provide index referencing specification section and page.
 - c. Tab individual sections.
 - 2. Each Electronic Submittal package shall be formatted as follows:
 - a. The full extent of the submitted data shall be presented in a single electronic file on a CD-ROM.
 - b. File Format Type: Adobe PDF, or universally readable equivalent.
 - c. Scanned information: Minimum 400 dpi.
 - d. Provide index referencing specification section and page.
 - e. Bookmark individual sections.
 - f. One file per CD-ROM.
 - 1) Format CD-ROM for use in PC compatible hardware.
 - 2) Format CD-ROM so that additional files may be written to it (read-write).
- D. Contractor may provide one (1) early submittal for items with long lead times as determined by the Contractor. The submittal shall be clearly identified as "Long Lead Time Item Submittal".
- E. The remainder of the shop drawings and product data shall be submitted as a single Project Submittal, except:
 - 1. Control system shop drawings and product data may be provided as a single, separate submittal package prior to beginning of control work on site.
 - 2. Fire Sprinkler Shop Drawings and Product Data may be provided as a single, separate submittal package before or after the project submittal.
 - 3. Seismic Restraint Shop Drawings, and Product Data may be provided as a single, separate submittal package before or after the Project Submittal.
- F. The Project Submittal must be submitted no more than three (3) weeks after the Long Lead Time Item Submittal. If the Project Submittal is found to be incomplete, it will be rejected and returned. The Project Submittal shall then be completed by the Contractor and resubmitted in its entirety.
- G. Definitions of comments used in submittal review:
 - 1. "No Exception Taken" The meaning and intent of this statement is that the Engineer finds no objection (except those noted thereon or in correspondence) to inclusion of items or Work indicated in construction provided that it:
 - a. Complies with Contract Drawings and Specifications as to quantities, space requirements, and dimensions.
 - b. Does not interfere with other trades.
 - c. Is not the cause of union tradesmen disputes.
 - d. Does not infringe on patent rights.
 - e. Is not the cause of injury or damage to persons or property.
 - f. Complies with OSHA regulations.
 - 2. "Rejected" The meaning and intent of this statement is that the submitted material does not conform to plans and specifications. Resubmittal of a different product or shop drawing is required.
 - 3. "Revise and Resubmit" This statement is used when the general product line is acceptable, but the submitted material varies in dimension, accessories, etc. from what is required. Resubmittal is required.
 - 4. "Make Corrections Noted" This statement is used as an alternative to "Revise and Resubmit" when resubmittal is not required.

5. Said review does not relieve Contractor of any Contractual responsibilities.

1.12 TEMPORARY FACILITIES AND CONTROLS

- A. Refer to Division 1.
- B. Use of Project equipment for temporary service during construction is acceptable in accordance with requirements and limitations listed herein, and in accordance with requirements referenced in Division 1.
 1. General Requirements:
 - a. Contractor shall notify Owner's Representative and the Engineer of intention to utilize Project equipment for temporary service. Indicate in writing what equipment will be utilized and indicate the start of use date for each.
 - b. Equipment start up shall comply with manufacturer's requirements. Where Factory startup is required, it shall be completed before equipment is used for temporary service.
 - c. Provide temporary control of equipment as necessary. Safety limits (non-freeze, low limit, etc.), and safety operating interlocks must be functional prior to use of the equipment.
 - d. Use of equipment for temporary service during construction shall not shorten or otherwise modify the warranty the Owner receives. Starting date for warranties shall remain in accordance with Division 1 and Divisions 20, 21, 22 and 23 stipulations.

1.13 SCHEDULING

- A. Schedule the Work of Divisions 20, 21, 22 and 23 in accordance with Division 1.
- B. Schedule Work at such a time, and in such a manner, to minimize interference and inconvenience to the Owner.
- C. Work in existing operating laboratories and offices that causes disruptions of existing services shall be coordinated with the Owner. Provide a minimum of 72 hour notice prior to any shutdown of existing services.

1.14 OPERATION AND MAINTENANCE MANUALS

- A. Provide operation and maintenance manuals for the Work of this Division in accordance with Division 1 and Section 20 2000.

1.15 MATERIAL AND EQUIPMENT

- A. Comply with Division 1.
- B. Similar products shall be of the same manufacturer.
- C. Comply with manufacturer's printed instructions, in addition to requirements of the Contract Documents, regarding storage, handling, installation, operation, and adjustment of materials and equipment.
- D. Protect ductwork, piping, outlets/inlets, equipment, and mechanical appurtenances from damage. Provide temporary covers as necessary to prevent accumulation of dust and debris.
- E. Notify the owners' authorized representative immediately of conflicts between manufacturer's instructions and Contract Documents. Resolve such conflicts before proceeding with the work.

1.16 CONTRACT CLOSEOUT

- A. Comply with Division 1.

1.17 FINAL CLEANING

- A. Provide cleaning for the Work of Divisions 20, 21, 22 and 23 in accordance with Division 1.

1.18 RECORD DOCUMENTS

- A. Provide Record Documents for the Work of this Division in accordance with Division 1.

- B. Record Drawings shall include:
 - 1. Contract Drawings

1.19 INSTRUCTION OF OPERATING PERSONNEL

- A. Provide instruction of Owner's operating personnel associated with the Work of Divisions 20, 21, 22 and 23 in accordance with Division 1.
- B. Instruct Owner's designated operating personnel in the operation and maintenance of all systems.
- C. Submit written certificate from Owner that Instruction of Operating Personnel has been performed.

1.20 WARRANTIES

- A. Provide and document warranties applicable to the Work of Divisions 20, 21, 22 and 23 in accordance with Division 1 and Section 20 2000.

1.21 DEMOLITION

- A. Provide demolition for the Work of this Division in accordance with Division 2.
- B. Where items are to be salvaged for relocation or retained by the Owner, removal shall cause no damage to these items. Move in accordance with manufacturer's instructions.

1.22 EXCAVATION AND BACKFILLING

- A. Provide trenching, excavation, and backfilling for the Work of Divisions 20, 21, 22 and 23.

1.23 PAINTING

- A. Provide painting for the Work of Divisions 20, 21, 22 and 23 in accordance with Division 9.
- B. Provide cleaning and surface preparation for products specified in Divisions 20, 21, 22 and 23 that have finishes specified in Division 9.
- C. Paint the following items with one coat of primer and two coats of oil-based enamel:
 - 1. Uninsulated black steel pipe which is not concealed within walls or above ceilings.
 - 2. Steel supports, stands, and brackets which are not galvanized or factory painted.
 - 3. Pipe rollers, hangers, and hanger rods which are not galvanized.
 - 4. Additional items noted on Drawings or in Divisions 20, 21, 22 and 23.
- D. Colors shall be approved by Architect.

Part 2 - Products (Not Used)

Part 3 - Execution (Not Used)

END OF SECTION

SECTION 20 20 00

MECHANICAL OPERATION AND MAINTENANCE MANUALS

Part 1 - General

1.01 SECTION INCLUDES

- A. General and specific requirements for Operation and Maintenance Manuals applicable to Division 20, 21, 22 and 23 sections. Requirements apply in addition to Division 1 requirements. Contractor shall provide Operation and Maintenance Manual for the Work of this Division.

1.02 SHOP DRAWINGS AND PRODUCT DATA

- A. Submittals required for the following, in accordance with Section 20 1000:
 - 1. Table of Contents (TOC) for the Operation and Maintenance Manual. Provide one complete TOC with Project Submittal.

1.03 CONTRACT CLOSEOUT

- A. Submittals required for the following, in accordance with Section 20 1000:
 - 1. Operation and Maintenance Manual. Provide 3 complete sets.
 - 2. Valve diagrams and directories. Provide laminated copies in addition to those included in O&M Manuals.

Part 2 - Products

2.01 GENERAL

- A. The requirements listed herein apply to one full set of the Operation and Maintenance Manual. Provide multiple copies of the set in accordance with requirements listed under Part 1 of this Section.
- B. Information provided in the Operation and Maintenance Manuals shall be customized for the specific equipment provided for, and as applied to, this Project.

2.02 PRESENTATION

- A. Format:
 - 1. Manufacturer's literature shall be pre-printed.
 - 2. Documents generated specifically for this project shall be machine printed on white paper, or typed.
 - 3. Hand written material is not acceptable unless specifically noted herein.
 - 4. Internally subdivide binder contents with permanent page dividers in accordance with the organizational format described herein. Tab titles shall, as a minimum, be legibly printed and inserted into reinforced laminated plastic tabs.
 - 5. Separate copies of valve directories and diagrams shall be laminated and mounted with chains in Mechanical Room. Specific location to be verified with Owner or Architect.
- B. Binding:
 - 1. In three-ring (D-side ring style) loose leaf plastic or cloth side binders. Paper report binders, or bend-tab thesis covers are not acceptable.
 - 2. 8-1/2 inch x 11 inch format.
 - 3. Ring size as necessary to contain the information for this project. Minimum ring size: 1 inch. Maximum ring size: 4 inch.
 - 4. Provide sheet lifters, front and back, in each notebook.
 - 5. Provide multiple binders where required to accommodate the data. Each binder maximum 80% full.
 - 6. Label each binder with typed, permanently adhered, labels on the front cover and the spine. Minimum Label information:
 - a. Project Name
 - b. Project Location

- c. Project Owner
 - d. Project Engineer
 - e. Volume (notebook no.) of (number of notebooks in one set of O&M Manuals)
- C. Provide a plastic page cover for each occurrence of the following pages:
- 1. Cover Sheet
 - 2. Table of Contents
 - 3. Nameplate Directory
 - 4. Valve Directory
 - 5. Service and Dealer Directory

2.03 ORGANIZATION AND CONTENT OF MANUAL

- A. Include in the front of EACH Notebook of the Operation and Maintenance Manual:
- 1. Cover Sheet
 - 2. Table of Contents:
 - a. List the contents of the full manual.
 - b. List full extent of major and minor divisions (tabs).
- B. Include the following information in the Project Operation and Maintenance Manual:
- 1. Directories, including:
 - a. Equipment and Nameplate Directory
 - b. Itemized Service and Maintenance Directory
 - c. Service and Dealer Directory
 - d. Warranties Directory
 - e. Valve Directory
 - 2. Material and Equipment Information (with Individual Tabs by Divisions 20, 21, 22 and 23 Section Number and Name), including:
 - a. Shop Drawings and Product Data
 - b. Manufacturer's Printed Operation and Maintenance Manuals
 - c. Service Contracts and Field Start-up Reports
 - 3. Cleaning, Certification, and Test Reports:
 - a. Domestic water system disinfections report and test results
 - b. Combination Fire/Smoke Damper Operational Certification
 - c. Copy of Testing, Adjusting, and Balancing (TAB) Report from Owner's TAB Contract.
 - d. Copy of Commissioning Report from Owner's Commissioning Contract.
 - 4. System Information (with Individual Tabs by Divisions 20, 21, 22 and 23 Section Number and Name), including:
 - a. Operation instructions
 - b. Record drawings (reduced size set)
 - c. Controls operation and maintenance Information

2.04 DESCRIPTION OF MANUAL CONTENT

- A. Cover Sheet, listing:
- 1. Project name and location
 - 2. Architect
 - 3. Engineer
 - 4. General Contractor
 - 5. Mechanical Contractor
 - 6. Electrical Contractor
- B. Table of Contents, listing:
- 1. Volume number.
 - 2. Section title
 - 3. Items included under each section (e.g., equipment name and number, parts list, service instructions, etc.)
- C. Directories (with Individual Directory Specific Tab):
- 1. "Equipment Nameplate Directory". This is a summary of the equipment included in the Project with a nameplate designation (code), such as "AHU-1", including:
 - a. Mechanical equipment type

- b. Nameplate designation
 - c. Manufacturer's nameplate data
 - 1) Data as read from the nameplate for the actual equipment provided
 - d. Installed location
 - 1) List room name and number
 - e. Area served
 - f. Control switch normal position
2. "Itemized Service and Maintenance Directory". Obtain information from the manufacturer. This is an itemized summary listing of service and inspection requirements. Itemize by Nameplate Designation (i.e.; AHU-1, CH-1, etc.). include:
 - a. Service and lubrication schedule:
 - 1) Filter, size, number of, performance, clean pressure drop, and recommended change-out.
 - 2) Bearing type, recommended lubricant, and frequency.
 - b. Inspection Requirements:
 - 1) Inspection type (e.g., belt wear, refrigerant charge, etc.), frequency, recommended actions.
 3. "Service and Dealer Directory". This is a summary of the equipment and material suppliers for the Project, including:
 - a. Company name for authorized service and parts
 - b. Physical address
 - c. Phone number, fax number, e-mail, and web site address (if available)
 - d. Summary listing of applicable equipment and materials
 4. "Warranties". In addition to the warranty statement, include:
 - a. Project name as shown on the Project Manual
 - b. The equipment (nameplate designation and description) and/or system to which the warranty applies
 - c. Effective date of the warranty
 - d. Expiration date of the warranty
 - e. Extent of the warranty
 - f. Company name, address, telephone number, and contact person for the issuer of the warranty
 5. "Valve Directory". This is a sequential, ascending, summary of the numbered valves in the Project, separated by system, including:
 - a. Valve number
 - b. Valve Type
 - c. Valve Size
 - d. Installed location
 - e. Valve function
 - f. Valve normal position
 6. "Valve Diagram." This is a graphic, diagrammatic (not to scale) chart showing valves with rooms and sections of piping served by each valve, separated by system, including:
 - a. Valve number
 - b. Piping type
 - c. Valve function (shutoff, throttling, sectionalizing, etc.)
- D. Material and Equipment Information (under individual material or equipment specification specific tabs):
1. Shop Drawings and Product Data for items reviewed, approved, and provided for this Project.
 2. Manufacturer's Printed Operation and Maintenance Manuals, including:
 - a. Manufacturer's parts list.
 - b. Information for starting, adjusting, and maintaining each item in continuous operation for long periods of time.
 - c. Dismantling and reassembling of the complete units and sub-assembly components with illustrations including "exploded" views showing and identifying each separate item.
 - d. Identification of special tools and instrument requirements.

- e. Detailed explanation of function and control of each piece of equipment, component, or accessory.
- f. Precautions for operation of equipment and reason for each precaution.
- g. Troubleshooting guide.
- 3. Service Contracts and Field Start-up Reports:
 - a. Provide for fans, boilers, chillers, etc.
 - b. Include list of inspection requirements to be completed prior to end of warranty.
- E. Cleaning, Certification, and Test Reports:
 - 1. Backflow Prevention Devices Inspection and Testing. Coordinate with requirements listed in Section 22 4100.
 - 2. Piping Systems Cleaning, Disinfection, and Chemical Treatment Report. Coordinate with requirements listed in Section 22 5400.
 - 3. Written certification of combination fire/smoke damper testing. Coordinate with requirements listed in Section 20 9100.
 - 4. Air and Water Balance Report. Coordinate with requirements listed in Section 20 9100.
 - a. When an Air and Water Balance Report is provided in a separate notebook (three-ring binder), reference the notebook as a volume of the Project Operation and Maintenance Manual set. Label the notebook accordingly.
 - 5. Seismic restraint system installation report certifying that seismic restraints are installed in conformance with approved shop drawings and no additional restraints are necessary based on field conditions. Include the written authorization, from seismic restraint system Engineer, of the designated representative.
 - 6. Commissioning Report. Coordinate with Owner's separate Commissioning Contract.
 - a. Where Commissioning Report is provided in a separate notebook (three-ring binder), reference the notebook as a volume of the Project Operation and Maintenance Manual set. Label the notebook accordingly.
- F. System Information:
 - 1. Operation Instructions. Under individual system specific tab. Provide complete, detailed guidance for the operation of each system (e.g., Hydronic System, etc.)
 - a. Information shall include:
 - 1) Start-up
 - 2) Routine and normal operation
 - 3) Adjustment and regulation
 - 4) Chemical treatment
 - 5) Testing
 - 6) Detection of malfunction
 - 7) Shut-down
 - 8) Cleaning
 - 9) Summer and winter operations
 - 10) Emergency operation
 - 2. Controls Operation and Maintenance Information. Coordinate with controls requirements listed in Division 23.
 - a. Where controls information is provided in separate notebook(s) (three-ring binder), reference the notebook(s) as volume(s) of the Project Operation and Maintenance Manual set. Label the notebook(s) accordingly.

Part 3 - Execution

3.01 GENERAL

- A. Information provided in the Operation and Maintenance Manuals shall be specific to actual equipment, materials, and systems provided under the Work of this project.
- B. Pre-printed Parts lists, service instructions, equipment data manuals, etc., shall be marked to indicate the model number of the corresponding item provided under the Work of this project.
 - 1. Use an arrow stamp to designate the pre-printed model numbers for Products applicable to this Project. Arrow shall be of a reproducible color (i.e.; red or black).
 - 2. Where the corresponding model number is not shown on a pre-printed sheet, hand write the model number, and associated data, in ink using legible block style lettering.

END OF SECTION

SECTION 20 42 00
SEISMIC RESTRAINTS

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals
- C. Section 20 34 00 - Fans
- D. Section 23 74 10 - Packaged Make-Up Air Units

1.02 SCOPE OF WORK

- A. Provide seismic restraints in accordance with ASCE Standard 7 requirements for piping, ductwork, and mechanical equipment.
- B. Provide engineering for seismic restraint system, assemblies, and components.
- C. Provide shop drawings and installation instructions for seismic restraint system.
- D. Provide final inspection and report for installed restraint system acceptance.

1.03 DEFINITIONS AND STANDARDS

- A. Referenced Standards:
 - 1. ASCE Standard 7: American Society of Civil Engineers / Structural Engineering Institute, *Standard 7, Minimum Design Loads for Buildings and Other Structures*
- B. Design Criteria:
 - 1. Occupancy Category: ASCE 7 Occupancy Category designation, Table 1.5-1
 - 2. Site Classification: ASCE 7 Site Classification designation, Table 20.3-1
 - 3. Peak Spectral Response Acceleration (S_S): ASCE 7 Figure 22-1 - Maximum Considered Earthquake Ground Motion of 0.2s spectral response acceleration, Site Class B
 - 4. Design Spectral Response Acceleration (S_{DS}): ASCE 7, Eqs. 11.4-3 and 11.4-4
 - 5. Seismic Design Category: ASCE 7 Seismic Design Category designation, Tables 11.6-1 and 11.6-2.
 - 6. Component Importance Factor (I_p): ASCE 7, Section 13.1.3
- C. Custom Engineered Assembly: Anchorage and seismic restraint assembly, comprised of standard or proprietary components, designed and applied to system by the Seismic Engineer.
- D. Pre-Engineered Assembly: Previously designed anchorage and seismic restraint assembly selected and applied to system by the Seismic Restraint System Engineer.
- E. Seismic Restraint System Engineer: Registered Professional Engineer currently licensed in Oregon as a structural, civil, or mechanical engineer. Responsible for designing, applying, and inspecting pre-engineered seismic restraint assemblies and components in accordance with applicable codes and component manufacturer's published recommendations.
- F. Seismic Engineer: Professional engineer currently licensed in Oregon as a structural, civil, or mechanical engineer. Responsible for designing, applying, and inspecting custom seismic restraint components in accordance with applicable codes.
- G. Equipment:
 - 1. Seismic anchoring of specific equipment :
 - a. Packaged Make-Up Air Unit MAU-1.

- b. High Plume Exhaust Fan FEF-2.
- 2. Includes (but not limited to) pumps, fans, air handling units, heat exchangers, etc. Equipment referred to by type is typical. Equipment not specifically listed here is still subject to the requirements listed herein.
- 3. Weight: Installed operating weight of equipment as reported by equipment manufacturer.
- 4. Integral Isolation: Isolators which are furnished as an integral part of the equipment.
- 5. Roof-Mounted: Equipment located above and attached to roof.
- 6. Floor-Mounted: Equipment located on and attached to floor.

H. Ductwork and Piping:

- 1. Duct Run: A length of duct without change in direction.
- 2. Piping Run: A length of pipe without change in direction.
- 3. Component Weight: Calculated installed (operating) weight of component.
- 4. Longitudinal Bracing: Restraints applied to limit motion parallel to the centerline of the pipe or duct.
- 5. Transverse Bracing: Restraints applied to limit motion perpendicular to the centerline of the pipe or duct.

1.04 PROJECT DESIGN CRITERIA

- A. Restraint system, assemblies, and components shall be designed and installed to resist lateral loads in accordance with the current adopted State of Oregon Structural Specialty Code.

- B. Seismic Design Criteria:

- 1. Occupancy Category: II
- 2. Site Classification: B
- 3. Peak Spectral Response Acceleration (S_s) = 0.81
- 4. Design Spectral Response Acceleration (SDs) = 0.54
- 5. Seismic Design Category: D
- 6. Maximum Allowable Lateral Loads and Anchorage Requirements: See Structural Drawings.
- 7. Component Importance Factors (IP): 1.0, except where otherwise noted below:
 - a. IP = 1.5:
 - 1) Piping Systems: Acid Waste, Acid Vent, Natural Gas.
 - 2) Duct Systems: Fume Hood Exhaust Ducts.

1.05 SYSTEM ENGINEERING AND QUALITY ASSURANCE

- A. Seismic restraint system shall be engineered to comply with criteria stated and referenced herein.
- B. Seismic restraints and related engineering for HVAC, plumbing, and piping systems to be provided by a single vendor.
- C. Application of Pre-engineered Assemblies by Seismic Restraint System Engineer:
 - 1. Application of Custom Engineered and/or Pre-Engineered Assemblies, as applicable to this project, and as follows:
 - a. Application of restraints for floor or roof-mounted equipment.
 - b. Application of restraints for curb mounted equipment including unit-to-curb and curb-to-structure attachments.
 - c. Application of seismic restraint assemblies for vibration isolated and suspended equipment.
 - d. Application of seismic restraint assemblies for piping and ductwork.
 - 2. Submittal packages shall bear the stamp of only the responsible Seismic Restraint System Engineer.
 - 3. Approved Pre-engineered Assembly and Application Services: Mason Industries, Kinetics, or an independent professional engineer meeting qualifications listed herein as Seismic Restraint System Engineer.

- D. Custom Engineered Assemblies:
 - 1. System engineering shall include design and Application of Custom Engineered Assemblies, as applicable to this project, and as follows:
 - a. Design and Application of restraints for floor or roof-mounted equipment.
 - b. Design and Application of restraints for curb mounted equipment including unit-to-curb and curb-to-structure attachments.
 - c. Design and Application of seismic restraint assemblies for vibration isolated and suspended equipment.
 - d. Design and Application of seismic restraint assemblies for piping and ductwork.
 - 2. Engineering shall be performed by, or under the direct supervision of, a Seismic Engineer meeting the qualifications listed herein. Submittal packages shall bear the signed seal of only the Seismic Engineer.
- E. For anchorage requirements and allowable lateral loads at attachment to building structural system, provide structural analysis and report from an independent Registered Structural Engineer currently licensed in the State of Oregon.]

1.06 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Pre-submittal:
 - 1. Included within project Mechanical Submittals, submit attached letter outlining how the seismic requirements for this project will be met (i.e., Pre-engineered Assemblies, Custom Assemblies). In the letter state what companies will be providing the services and the qualifications of the responsible individuals.
- B. Shop drawings shall be submitted as one complete package inclusive of all mechanical systems and equipment.
- C. Submit the following in accordance with Section 20 10 00 (Reference isolated equipment as numbered in Contract Documents):
 - 1. Seismic Restraint Location Plan: Full or half size copies of ductwork and piping plans from the Contract Documents, showing locations and type of seismic restraint assemblies to be used.
 - a. Drawings shall consist of mechanically reproduced copies of the Contract Documents, or custom drafted specifically for the Work of this Project and bear only the seal of the Seismic Restraint System Engineer or Seismic Engineer. All other seals shall be eradicated from drawings prior to submittal.
 - b. Provide separate drawings for ductwork and piping systems.
 - c. Each drawing shall be printed on a single sheet. Drawings pieced together from multiple copies are not acceptable.
 - 2. Seismic Restraint Assembly Installation Details: Pre-Engineered or Custom Engineered assembly details showing required components, dimensions, and method of connection to supporting structure.
 - 3. Calculations For System Application: Calculations shall indicate maximum forces anticipated at each restraint assembly, method of determining forces, and selection of restraint assemblies.
 - a. For Pre-Engineered Assemblies, include documentation of design conditions, maximum load capacity of assembly, and maximum forces at anchorage points.
 - b. For Custom Engineered Assemblies, submit calculations identifying maximum load capacity of assembly, maximum forces on each component, sizing/selection of each component, and maximum forces at anchorage points.
- D. The entire submittal package comprised of drawings, details, and calculations for mechanical ductwork, piping, and equipment shall be stamped and signed in accordance with the requirements listed under 1.05 SYSTEM ENGINEERING AND QUALITY ASSURANCE in this specification section.

- E. At seismic restraint system installation completion, submit three (3) copies of report from seismic restraint system Engineer, or the Engineer's representative, certifying that seismic restraints are installed in conformance with approved shop drawings and no additional restraints are necessary based on field conditions. Include written authorization, from Seismic Restraint System Engineer, of the designated representative.
- F. Prior to Contract Closeout submit Operation and Maintenance information required as indicated in Section 20 20 00.

Part 2 - Products

2.01 PRE-ENGINEERED ASSEMBLIES

- A. Anchorage and seismic restraint assemblies, comprised of standard or proprietary components, capable of application to restraint system and supporting structure.
- B. Acceptable Proprietary Manufacturers: Mason Industries, Kinetics, Tolco, B-Line, or approved.

Part 3 - Execution

3.01 GENERAL

- A. Seismic restraint system shall be installed in strict accordance with the manufacturer's written instructions and certified submittal data.
- B. Conflicts with other trades that result in rigid contact with the equipment or piping due to inadequate space or other conditions shall be coordinated with the Seismic Restraint Engineer and corrected.
- C. Attach restraints and anchors to a common structural element plane and within a common structural system.
- D. For vibration isolated suspended equipment, piping, and ducts, install flexible cable restraints slightly slack to avoid vibration short circuiting.
- E. For non-isolated suspended equipment, piping, and ducts, install solid braces or taut flexible cable restraints.
- F. Provide supplementary support steel for equipment, piping, and ductwork required for the work of this Section.

3.02 EQUIPMENT SEISMIC RESTRAINT

- A. Coordinate size of housekeeping pads and/or concrete piers to ensure adequate space for required bases, isolators, restraints, and attachment thereto.

3.03 DUCTWORK AND PIPING SEISMIC RESTRAINT

- A. Provide minimum of two transverse supports and one longitudinal support on each pipe or duct run. Transverse bracing shall be installed at each turn and at each end of a run with a minimum of one brace at each end. Where a pipe or duct run is shorter than the minimum interval between braces, provide braces at each end.
- B. Where restraints are attached to clevis style pipe hangers, the cross bolt must be reinforced.

3.04 EQUIPMENT WITH VIBRATION ISOLATION SUPPORTS

- A. Anchor isolator to structural system in accordance with details on Drawings and isolator manufacturer's instructions.

3.05 PIPING WITH VIBRATION ISOLATION SUPPORTS

- A. Seismic restraints for vibration isolated piping shall be installed to restrict excessive lateral, vertical, and longitudinal motion without providing support or rigid contact between piping and structure during normal operation.

END OF SECTION

SECTION 20 42 00 - SEISMIC RESTRAINT SYSTEM ENGINEERING PRE-SUBMITTAL

PROJECT: _____
(Project Title)

The Undersigned states the following:

- Seismic restraints for the work of Divisions 22 and 23 for this project will be provided as required in Section 20 42 00.
- Application of Pre-Engineered Restraint Assemblies will be provided by Seismic Restraint System Engineer meeting qualifications of Section 20 42 00.

Seismic Restraint System Engineer: _____

Firm Name: _____

Authorized Representative: _____

(Name of representative authorized to act on Engineer's behalf)

- Design for Custom Engineered Restraint Assemblies will be provided by Seismic Engineer meeting qualifications of Section 20 42 00.

Seismic Engineer: _____

Firm Name: _____

Authorized Representative: _____

(Name of representative authorized to act on Engineer's behalf)

- Upon completion of seismic restraint system installation the Engineers listed above, or the designated representative listed, will inspect and certify that seismic restraints are installed in conformance with approved shop drawings and, based on actual field conditions, no additional restraints are necessary to comply with applicable codes.

Submitted by: _____ Signature: _____

Firm: _____

Address: _____

Telephone: _____ E-mail: _____

Date: _____

SECTION 20 60 00

MECHANICAL IDENTIFICATION

Part 1 - GENERAL

1.01 RELATED SECTIONS

- A. Section 20 1000 - General Mechanical Provisions

1.02 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 1000. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 2000.
- B. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 2000 for a description of each type of information.
 1. Shop Drawings (submittal data)
 2. Product Data (submittal data)
 3. Manufacturer's Operation Manuals
 4. Manufacturer's Service and Lubrication Requirements
 5. Service Contracts and Field Start-up Reports
 6. Cleaning, Certification, and Test Reports
 7. System Information
 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Pipe Labels		X						
Equipment Nameplates		X						
Regulatory Signage	X	X						
Pipe Union Labels	X	X						

1.03 REFERENCES

- A. ANSI A13.1 (American National Standards Institute) - Scheme for the Identification of Piping Systems, latest edition.
- B. NFPA 99 (National Fire Protection Association) - Standard for Health Care Facilities, latest edition.

Part 2 - Products

2.01 PIPE LABELS

- A. Pipe Labels:
 1. Type: Preformed plastic or adhesive-backed vinyl, with factory printed legend on colored background.
 2. Letter Size: Conform to ANSI A13.1 1981.
 3. Background Color: Conform to ANSI A13.1 1981.
 4. Flow Direction Arrow: At each pipe label.
 5. Legend Wording:
 - a. Match the pipe description shown in Symbols List on Drawings.
 - b. Steam piping: Include nominal pressure (e.g. 60psi or 20psi).
 6. Manufacturer: Seton, Brady, MSI, or approved.

2.02 EQUIPMENT NAMEPLATES

- A. Nameplates:
 - 1. Type: Laminated plastic, with engraved white letters on black background.
 - 2. Letter Size: 1/2 inch tall.
- B. Provide nameplates for mechanical equipment -- including air handling units, fans, pumps, terminal units, heat exchangers, expansion tanks etc. Wording to match equipment designations on Drawings.
- C. Nameplate of each mechanical equipment shall include "area served" or "system served". See Drawing Schedules for description of area or system served.
- D. Provide nameplates for control panels and major control components.
- E. Attach nameplates with rivets or screws; adhesive only fastening not permitted. Provide weather-proof sealant for outdoor applications where screws penetrate casing.
- F. At room thermostats and temperature sensors, write the name of the unit served on the inside of cover in permanent ink.

2.03 REGULATORY SIGNAGE

- A. Non-Potable Water Signs:
 - 1. Type: 60 mil thickness, press-polished vinyl plastic rectangular sign with rounded corners. Sign shall be factory configured with one mounting hole in each corner.
 - 2. Size: 10 inches wide by 7 inches tall.
 - 3. OSHA Header: "Caution".
 - 4. Warning Language: NONPOTABLE WATER. DO NOT DRINK.
 - 5. Colors:
 - a. Background - Yellow
 - b. Lettering - Black
 - 6. Manufacturer: Seton or approved.

2.04 MISCELLANEOUS LABELS

- A. Pipe Union Labels:
 - 1. Material: White vinyl, self-adhesive, permanent.
 - 2. Red lettering, minimum 1/2 inch tall.
 - 3. Labels at unions and die-electric unions read "UNION".
 - 4. Manufacturer: Seton, Brady, MSI, or approved.

Part 3 - Execution

3.01 PIPE LABELS

- A. Provide labels for piping.
- B. Labels shall be oriented to be visible from the normal access side of the pipe.
- C. Locate pipe labels as follows:
 - 1. Within 3 feet of each valve.
 - 2. Within 3 feet of each equipment connection.
 - 3. Within 3 feet of each wall, floor, or ceiling penetration.
 - 4. Within 3 feet of each branch.
 - 5. At intervals along the pipe, not to exceed 20 feet on center.
 - 6. In Tunnels, or Utilidors as indicated previously except:
 - a. Maximum 100 feet on center.
 - b. On each side of an accessway, within 5 feet of the opening.
- D. Prior to label installation; clean pipe or insulation surfaces according to label manufacturer's recommendations.

- E. Review pipe labeling with Owner during construction, prior to application. Labeling shall be as approved by Owner (University Construction Project Manager) and per Owner's published construction standards. Refer to <http://campusops.uoregon.edu/cc/cc-standards>.

3.02 REGULATORY SIGNAGE

- A. Sign location and mounting shall be in accordance with OSHA Requirements.
- B. Wall mount one Non-potable water sign immediately adjacent to each fixture with water service from a Non-potable lab water distribution system.
- C. Signs shall be secured to the wall with screws. Provide suitable accessories for the wall type where each sign is mounted.
- D. Sign location shall be adjusted such that a clear and unobstructed view is provided. Final placement of each sign shall be approved by the Owner's Representative.

3.03 PIPE UNION LABELS

- A. Provide label for each union and die-electric union concealed inside pipe insulation. Orient label parallel with pipe run and position to be visible from the normal access side of the pipe.
- B. Prior to label installation, clean surfaces in accordance with label manufacturer's instructions.

END OF SECTION

SECTION 20 91 00

TESTING, ADJUSTING, AND BALANCING

(PROVIDED BY OWNER. SECTION REFERENCED HERE FOR REQUIREMENTS)

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 – General Mechanical Provisions
- B. Section 20 20 00 – Mechanical Operation and Maintenance Manuals
- C. Section 23 34 00 – Fans
- D. Section 23 74 10 – Packaged Make-Up Air Units

1.02 SECTION INCLUDES

- A. Testing, adjusting, and balancing (TAB) of air systems.
- B. Testing, adjusting, and balancing (TAB) of water systems.
- C. Measurement of final operating conditions of HVAC equipment.

1.03 QUALITY ASSURANCE

- A. Work of this Section shall be done in accordance with the current edition of the *NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems*.

Part 2 - Products (Not Used)

Part 3 - Execution

3.01 SCOPE OF WORK

- A. Balance supply and exhaust outlets and inlets where noted on the drawings.
- B. Existing Reheat Coils Serving 113N and 113S:
 - 1. Check and balance heat water flow to reheat coils
 - 2. Measure leaving air temperature downstream of coil.
- C. Existing Room Thermostats in 113N and 113S:
 - 1. Set Lab thermostat at 72 deg F.
 - 2. Check and report setpoints and room temperature after all adjustments have been made with the HVAC system operating under automatic control.
- D. Fume Hoods:
 - 1. Balance fume hood exhaust airflow to the air quantity shown on the drawings with the sash set at an operating height of 18" and 100 fpm face velocity through the sash opening.
- E. Lab Pressurization:
 - 1. Adjust supply and general exhaust CFM at the balancing dampers to provide a negative differential pressure of 0.03" w.g. minimum between Labs 113N and 113S, and the adjacent corridor.
- F. Check the following and report to Contractor for necessary corrections:
 - 1. Drafts, noise and vibration.
 - 2. Building pressure under normal operating conditions.

3.02 ADJUSTMENT AND BALANCING

- A. Mechanical Equipment:
1. Provide unit designation and area served.
 2. Provide motor design data including HP, volts, phase, and speed (RPM).
 3. Provide motor nameplate data including manufacturer, frame, HP, volts, phase, FLA, RPM, service factor, and nameplate efficiency (Energy Efficient or Premium Efficiency).
 4. Provide motor measured data including volts and amps each phase, RPM, installed starter manufacturer and size, and installed thermal overcurrent protection size and adjustment.
 5. List fan design data including CFM, SP, HP, BHP, RPM.
 6. Provide fan nameplate data including manufacturer, model, size, type, and serial number.
 7. After final adjustments, provide data on installed belt drives including fan motor base position, shaft center-to-center measurement, sheave manufacturer, size, and turns open for adjustable sheaves.
 8. Provide belt manufacturer, size, and model number.
 9. List sizes and quantities of air filters.
 10. Measure and report actual fan test data including FLA, fan rpm, ESP, TSP, supply CFM, return CFM, exhaust CFM, outside air CFM, coil gpm, EAT, LAT.
 11. Adjust fan speed, providing belt and sheave changes as needed to meet air outlet flow tolerances at minimum fan amperage draw.
- B. System Supply and Exhaust outlets:
1. Measure airflow with Shortridge Diffuser Hood or for oversized outlets measure by traverse.
 2. List method of measurement.
 3. List required design cfm, velocity, AK.
 4. List initial velocity, cfm, and percent of design flow at each inlet and outlet.
 5. Coordinate with controls installer in Section 23 09 00 to command variable air volume (VAV) devices fully open. Where fan total is less than terminal unit totals due to load diversity (verify), open VAV devices in groups of zones per NEBB procedures.
 6. Measure supply outlet flows at minimum and 100% outside air.
 7. Measure supply outlets served by variable volume terminal units at minimum and maximum flows.
 8. Proportion flow between outlets. Report outlet and inlet flows as actual CFM and as percent of required. Adjust and list, or re-adjust fan speed, until volumes are within specified flow tolerances.
 9. Adjust diffuser patterns to minimize drafts.
 10. Mark final positions of balancing dampers.
- C. System flow tolerances at maximum flow: -10 percent to +10 percent.
- D. Repair:
1. Provide plastic plugs to seal holes drilled in ductwork for test purposes.
 2. Repair or replace insulation removed or damaged for TAB work. Refer to requirements for insulation in Sections 22 14 10, 22 41 20, and 23 07 00.

END OF SECTION

SECTION 22 11 00

PIPING

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals

1.02 TRENCHING, BACKFILLING, AND COMPACTION

- A. Provide trenching, backfilling, and compaction for the Work of this Section.
- B. Trenching, backfilling, and compaction shall comply with requirements referenced in Section 20 10 00, in addition to requirements specified in this Section.

1.03 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data)
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Lab Waste and Vent Pipe and Fittings		X						
Pipe Supports		X						

1.04 DEFINITIONS

- A. Indoors: Inside building insulation envelope.
- B. Outdoors or Wet Areas: Outside building insulation envelope.
- C. Accessible Locations: Installed where exposed or installed above accessible ceiling systems.
- D. Inaccessible Locations: Installed in concealed spaces such as walls, shafts, chases, or above inaccessible ceilings.

Part 2 - Products

2.01 PLUMBING PIPING

- A. Industrial Cold Water (Non-Potable) (ICW), 2-1/2 inch diameter & smaller:
 - 1. Pipe: Type L copper, hard drawn, ASTM B-88.

2. Fittings: Wrought copper, ANSI B-16.22.
3. Joints: Lead-free 95-5 tin-antimony solder or silver/copper-alloy brazed.

B. Lab Waste and Vent (LW, LV):

1. Pipe: Schedule 40, flame-retardant polypropylene.
2. Fittings: Flame-retardant polypropylene, standard DWV patterns.
3. Joints:
 - a. Above Ground: Mechanical.
 - b. Buried: Thermal fusion.
4. Transition Couplings: Approved for use with systems to be joined.
5. Pipe, Fitting, and Coupling Manufacturer: Iplex (Enfield) Lab Line to match owner's standards.

C. Cooling Coil Condensate Drain (CD) outside building:

1. Option #1:
 - a. Pipe: Schedule 40 PVC, ASTM D-1785, Type 1.
 - b. Fittings: Schedule 40 PVC, ASTM D-2466.
 - c. Joints: Solvent cemented, in accordance with ASTM D-2855, using ASTM D-2564 solvent cement and ASTM F-656 primer.
 - d. Paint: One coat outdoor latex.
2. Option #2:
 - a. Pipe: Type M copper, hard drawn, ASTM B-88.
 - b. Fittings: Wrought copper, ANSI B-16.22.
 - c. Joints: Lead-free 95-5 tin-antimony solder, or approved.

D. Indirect Drain Piping (D):

1. Pipe: DWV copper tube, ASTM B-306.
2. Fittings: Cast bronze solder joint drainage fittings, ANSI B16.23.
3. Joints: Lead-free 95-5 tin-antimony solder, or approved.

2.02 FUEL AND FUEL VENT PIPING

A. Natural Gas (G), above grade, 2-1/2 inch diameter and smaller:

1. Pipe: Schedule 40 black steel, ASTM A-53, Grade B.
2. Fittings: Malleable iron, class 150, ANSI B-16.3.
3. Joints: Screwed.

2.03 FLEXIBLE PIPE CONNECTIONS

A. Natural Gas:

1. Corrugated double wall.
2. One piece construction.
3. 24 inches maximum length.
4. Suitable for outdoors.
5. A.G.A. Design Certified, C.G.A. listed.
6. Manufacturer: Brasscraft, Roberts Manufacturing, Eastman or approved.

2.04 PIPING SPECIALTIES

A. Escutcheons:

1. Construction:
 - a. 2" diameter opening and smaller: Cast brass, nickel-plated with set screw.
 - b. Over 2" diameter opening: Chrome plated stamped steel.
2. Size: Sufficient to cover sleeves and openings.

B. Unions for steel pipe:

1. Body: Iron
2. Seat: Brass.
3. Rated Working Pressure:
 - a. Domestic Water: 125 psi minimum.

- b. Hydronic: 250 psi minimum at 210 degrees F.
 - 4. Connection: Screwed or flanged to match pipe.
- C. Unions for copper pipe:
 - 1. Body: Bronze.
 - 2. Seat: Brass.
 - 3. Rated Working Pressure:
 - a. Domestic Water: 125 psi minimum.
 - b. Hydronic: 250 psi minimum at 210 degrees F.
 - 4. Connection: Screwed, brazed, or flanged to match pipe.
- D. Unions for connecting copper pipe to steel pipe, 2-1/2 inch and smaller:
 - 1. Description: Standard brass body union.
 - 2. Rated Working Pressure: 250 psig minimum at 210 degrees F.
 - 3. Connection: Screwed or brazed, to match pipe.
- E. Flashing at Vents Through Roof:
 - 1. Type: 24 gauge galvanized steel with neoprene seal around vent pipe.

2.05 PIPE STRAPS

- A. Pipe Straps for uninsulated pipe 1 inch or smaller running atop and perpendicular to wood framing:
 - 1. Description: Commercially manufactured single-type flat mounting double ear heavy-duty pipe straps, preformed to fit pipe.
 - 2. Minimum width 1/2 inch, minimum thickness 0.032 inch.
 - 3. Minimum mounting hole diameter: 7/32 inch.
 - 4. Material: Brass or copper for copper pipe, galvanized or chrome plated steel for iron, steel, or plastic pipe.
 - 5. Fasteners: Screws, minimum 5/8 inch long. Heads must exceed hole diameter by at least 1/8 inch.

2.06 PIPE SUPPORTS

- A. Ring Hangers for Pipe Sizes 3 inch and smaller:
 - 1. Type: Carbon steel band, adjustable, with knurled swivel nut.
 - 2. Finish:
 - a. Indoors: Zinc plated.
 - b. Outdoors or Wet Areas: Hot dip galvanized.
 - 3. Approvals: UL and FM.
 - 4. For uninsulated copper piping: Equivalent to model specified, with addition of copper plating, neoprene coating, or PVC coating.
 - 5. Manufacturer:
 - a. Anvil Fig. 70
 - b. B-Line Fig. B 3170
 - c. Super Strut C-727
 - d. PHD Model 151
 - e. Erico/Michigan Model 100
- B. Hanger Rods:
 - 1. Material: Carbon steel.
 - 2. Finish:
 - a. Indoors: Zinc plated.
 - b. Outdoors or Wet Areas: Hot dip galvanized.

2.07 SLEEVES AND SEALS

- A. Sleeves:
 - 1. Material: Galvanized steel.
 - 2. Minimum Gauge: 20 gauge minimum.
 - 3. Minimum Size: 1/2 Inch larger than diameter of pipe, including insulation.

Part 3 - Execution

3.01 GENERAL

- A. Install products in accordance with manufacturer's recommendations.
- B. Install piping plumb and parallel true to building structural system.
- C. Where possible, use full 20 foot lengths.
- D. Install branch piping to allow for expansion with offsets and swing joints as necessary to prevent undue strain.
- E. Do not use bushings and close nipples.
- F. Do not penetrate structural members.
- G. Screwed joints shall have less than two percent of threads showing.
- H. Ream pipes to full inside diameter prior to making up joints.
- I. Comply with applicable IAPMO Installation Standard for each particular piping material.
- J. Make branches and elbows with fittings specified herein. "Pulled tees", saddle taps, and field fabricated fittings are not acceptable.
- K. Testing of Piping Systems:
 - 1. Advise Architect or authorized representative when testing will be performed.
 - 2. Test before concealing pipe joints and welds.
 - 3. Before testing, isolate all equipment or components which are not rated for test pressures.
 - 4. Record temperature at start and finish of test. Pressure readings at finish of test shall be adjusted to account for temperature change of medium during the test.
 - 5. Test pressures shall be as specified herein for each type of piping system.
 - 6. Comply with testing requirements of authorities having jurisdiction, in addition to requirements specified herein.
 - 7. Piping systems shall hold test pressure for a minimum of one hour with no leakage.

3.02 PLUMBING PIPING

- A. Domestic and Industrial Water Piping:
 - 1. Slope toward low points of system and provide ball valves with caps for drainage.
 - 2. Test Pressure: Fill system with water and pressurize to 125 psig.
 - 3. Joints nominally 1" diameter or smaller not permitted below grade.
- B. Drain and Waste Piping:
 - 1. Slope 1/4 inch per foot, minimum, unless otherwise noted on Drawings.
 - 2. Test Pressure: Fill system with water to highest point.
 - 3. At pipes crossing building seismic joints, install four 6-inch long sections of pipe with no-hub couplings.
- C. Vent Piping:
 - 1. Vents through roof shall be plumb, with weatherproof flashing.
 - 2. Slope 1/2 inch per 10 feet, down toward fixture served.
 - 3. Test Pressure: Fill system with water to highest point.
 - 4. At pipes crossing building seismic joints, install four 6-inch long sections of pipe with no-hub couplings.

3.03 FUEL PIPING

- A. Natural Gas Piping:
 - 1. Install and test in accordance with NFPA 54 and applicable local codes.

2. Provide electrically continuous No. 18 yellow insulated copper tracer wire buried above plastic gas pipe.
3. In addition to tracer wire, provide metallic detection tape, marked "gas pipe below", buried 6 inches below grade, directly above plastic gas pipe.
4. Connections between plastic and steel gas pipe shall be made underground with ASTM D2513 Category 1 mechanical joint transition fittings, which provide a seal and resistance to pullout.
5. For threaded fittings, couplings and other threaded connections use liquid thread sealant, Jomar, Rectorseal, Form-a-gasket or approved. Teflon tape is not permitted.

3.04 PIPING SPECIALTIES

- A. Escutcheons:
 1. Install on exposed pipe through walls, floors, or ceilings where visible from space.
 2. Secure escutcheon to pipe and wall with caulk.
 3. Escutcheons not required in mechanical rooms.
- B. Unions for steel pipe:
 1. Provide unions as follows:
 - a. Where indicated on Drawings.
 - b. At each automatic control valve.
 - c. As required for removal of pumps, steam traps, and equipment with piping connections.
- C. Unions for copper pipe:
 1. Provide unions as follows:
 - a. Where indicated on Drawings.
 - b. At each automatic control valve.
 - c. As required for removal of pumps, steam traps, and equipment with piping connections.
- D. Unions for connecting copper pipe to steel pipe, 2-1/2 inch and smaller:
 1. Provide unions as follows:
 - a. Where indicated on Drawings.
 - b. At connection points between copper and steel pipe.
 - c. Not required at heating and cooling coil connections.
 - d. Install in accessible locations.

3.05 PIPE SUPPORTS

- A. General:
 1. Refer to Section 22 14 10 to determine pipe insulation requirements.
 2. Supports for the following shall bear directly on the pipe:
 - a. Uninsulated pipe.
 - b. 1 inch and smaller domestic hot water and heating water pipe.
 3. Size hangers to fit outside of pipe insulation, except where hangers shall bear directly on the pipe.
 4. Provide pipe support shoe welded to pipe at each roller hanger.
 5. Comply with applicable IAPMO Installation Standard for particular piping material.
- B. Insulated Pipe Shields:
 1. Provide insulated pipe shield at each support, except as follows:
 - a. Pipe sizes 1 inch and smaller.
 - b. Where supports are permitted to bear directly on the pipe.
 - c. Where support shoes are required.
 2. Secure insulation with 16 gauge stainless steel wire, stainless steel bands, or nylon tape as recommended by insulation manufacturer.
 3. Cover pipe insulation with aluminum jacket and preformed fitting covers.
 4. For cold pipe installations, seal seams and joints in jacket with vapor barrier mastic or tape, to provide a continuous positive vapor barrier.

- C. Steel Pipe, Horizontal:
1. Support within 2 feet of each direction change.
 2. Maximum spacing of supports:

<u>Pipe Size</u>	<u>Rod Diameter</u>	<u>Maximum Spacing</u>
1 inch and smaller	3/8 inch	7 feet 0 inches
1-1/4 inch - 2 inch	3/8 inch	10 feet 0 inches
2-1/2 inch - 3-1/2 inch	1/2 inch	10 feet 0 inches
4 inch	5/8 inch	12 feet 0 inches
5 inch and larger	3/4 inch	12 feet 0 inches

- D. Copper Pipe, Horizontal:
1. Support within 2 feet of each direction change.
 2. Maximum spacing of supports:

<u>Pipe Size</u>	<u>Rod Diameter</u>	<u>Maximum Spacing</u>
1-1/2 inch and smaller	3/8 inch	6 feet 0 inches
2 inch and larger	3/8 inch	10 feet 0 inches

- E. PVC and ABS DWV Pipe, Horizontal:
1. Support at every change of direction or elevation.
 2. Support ends of mains.
 3. Maximum spacing of supports: 4 feet o.c.

- F. Plastic Pipe, Horizontal:
1. Support 4 foot maximum on center or provide a continuous angle support under pipe per manufacturer's recommendations.
 2. Support to permit axial movement.

3.06 SLEEVES AND SEALS

- A. Install sleeves and seals at pipe penetrations through walls and floors. Insulation shall be continuous through penetrations. Coordinate with pipe insulation requirements in Section 22 14 10.
- B. Provide mechanical seal between pipe and sleeve at basement wall penetrations and as noted on Drawings.
- C. Caulk between pipe and sleeve at penetrations of walls and floors which are not fire-rated.

END OF SECTION

SECTION 22 13 00

VALVES

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals

1.02 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data)
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Ball Valves		X						
Gas Valves		X						

Part 2 - Products

2.01 BALL VALVES

- A. Ball Valves:
 - 1. Type: Full port, 2-piece body with stainless steel trim.
 - 2. Body: Bronze.
 - 3. Rated Working Pressure: Minimum of 150 psig steam; 600 psig WOG.
 - 4. Handle:
 - a. Uninsulated Pipe: Standard lever handle.
 - b. Insulated Pipe: Extended lever handle.
 - 5. Ends: Threaded or soldered.
 - 6. Stem and Ball: 316 stainless steel.
 - 7. Seat and Seals: PTFE, TFE, or Buna-N.
 - 8. Standard: MSS SP-110.
 - 9. Manufacturer: Crane, Worcester, Apollo, Watts, Hammond, Grinnell, Milwaukee, WKM, Jomar, or approved. Similar to Apollo 70-140 (threaded) or Apollo70-240 (soldered).

2.02 GAS VALVES

- A. Gas Valves, Size 2 Inch and Smaller:
 - 1. Description: Ball valve listed for natural gas shutoff.
 - 2. Listings: UL YRPV or UL 842.
 - 3. Body: Bronze.
 - 4. Handle: Wing or lever type.
 - 5. Ends: Threaded.
 - 6. Ball: Chrome-plated brass.
 - 7. Seat and Stem Packing: Teflon or RPTFE.
 - 8. Manufacturer: Conbraco-Apollo, or approved. Similar to Conbraco- Apollo 90-100 Series.

Part 3 - Execution

3.01 GENERAL

- A. Valves shall be full line size, except where noted otherwise.
- B. Install valves in locations which are accessible without damage to finished walls and ceilings.
- C. Where possible, position valve operator towards access opening.

END OF SECTION

SECTION 22 14 10

PIPING INSULATION

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions

1.02 QUALITY ASSURANCE

- A. Products shall have flame spread and smoke developed ratings based on test procedures in accordance with NFPA-255 and UL-723. Ratings shall be indicated on the product or on the shipping cartons.
- B. Unless otherwise specified herein, products shall have flame spread ratings not to exceed 25 and smoke developed ratings not to exceed 50.
- C. Products shall comply with the requirements of Oregon Revised Statute (ORS) 453.005 (7) (e), effective January 1, 2011. The referenced statute limits the use of three types of brominated fire retardant chemicals, which are defined as hazardous substances.

1.03 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Operation & Maintenance Information required for the products listed in the Product Table, indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data), including documentation of ORS 453.005 (7) (e) compliance.
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Pipe Insulation		X						

Part 2 - Products

2.01 PIPE INSULATION

- A. Preformed Fiberglass (FG):
 - 1. General: Preformed to fit pipe size, with factory applied vapor barrier facing.
 - 2. Conductivity ("k"): Not to exceed 0.24 at 75 degrees F mean temperature.
 - 3. Vapor Barrier Facing:
 - a. General: Factory applied, glass fiber reinforced kraft and aluminum foil laminate.
 - b. Permeability: Not to exceed 0.02 perms.
 - c. Closure System: Self-sealing pressure sensitive lap.
 - 4. Manufacturer and Model: Owens Corning "Evolution Paper-free ASJ", or approved.

2.02 ACCESSORIES

- A. Insulating Cement: Comply with ANSI/ASTM C195.
- B. Finishing Cement: Comply with ASTM C449.
- C. Mastic, Coatings, Tapes, and Adhesives: Comply with Manufacturer's installation instructions for each type of insulation.

Part 3 - Execution

3.01 GENERAL

- A. Install products in accordance with Manufacturer's instructions.
- B. Install products in accordance with MICA (Midwest Insulation Contractors Association) - National Commercial & Industrial Insulation Standards.
- C. Insulate new pipe, fittings, valves, and specialties for each piping system included under APPLICATION TO PIPING SYSTEMS.
- D. Insulate pipe, fittings, valves, and specialties where existing insulation is removed to facilitate the remodel work.
- E. Where insulated piping is to be removed, report any portions which appear to be existing friable insulation to Owner's Representative. Repair and removal of asbestos are not part of this work.
- F. Verify piping has been tested and approved before installing insulation.
- G. Clean and dry piping before installing insulation.
- H. Label insulation that covers unions. Refer to Section 20 60 00 for labeling requirements.

3.02 APPLICATION TO PIPING SYSTEMS

- A. Industrial Cold Water (ICW):
 - 1. Type: FG.
 - 2. Thickness: One inch.

END OF SECTION

SECTION 23 07 00

DUCTWORK INSULATION

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals

1.02 QUALITY ASSURANCE

- A. Products shall have flame spread and smoke developed ratings based on test procedures in accordance with NFPA-255 and UL-723. Ratings shall be indicated on the product or on the shipping cartons.
- B. Unless otherwise specified herein, products shall have flame spread ratings not to exceed 25 and smoke developed ratings not to exceed 50.
- C. Products shall comply with the requirements of Oregon Revised Statute (ORS) 453.005 (7) (e), effective January 1, 2011. The referenced statute limits the use of three types of brominated fire retardant chemicals, which are defined as hazardous substances.

1.03 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data), including documentation of ORS 453.005 (7) (e) compliance.
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Duct Insulation		X				X		
Accessories		X						

Part 2 - Products

2.01 DUCT INSULATION

- A. Fiberglass Blanket with Vapor Barrier:
 - 1. Type: Flexible blanket with factory applied vapor barrier facing.
 - 2. R-Value: R-5.2 for 1-1/2" insulation thickness out of package.
 - 3. Facing: Laminated aluminum foil, glass scrim, and kraft paper vapor barrier; with 2 inch sealing flap.

4. Facing Permeability: Not to exceed 0.04 perms.
5. Manufacturer and Model: Johns Manville, Certain Teed, Knauf, Owens Corning, or approved, equal to Manville "Microlite XG Type 75".

B. Flexible Duct Liner:

1. Type: Flexible fiberglass liner in roll form with black mat coating exposed to airstream.
2. Noise Reduction Coefficient: Not less than 0.7, in accordance with ASTM C-423-81a.
3. R-Value and Thickness: R-4.2 for 1" and R-8 for 2" insulation thickness.
4. Conductance: Not to exceed 0.13 at 75 degrees F mean temperature for 2" thick insulation.
5. Maximum Service Velocity: Not less than 4,000 feet per minute.
6. Manufacturer: CertainTeed, Knauf, Owens Corning, Johns Manville, or approved. Similar to Johns Manville "Duct Liner PM."

2.02 ACCESSORIES

A. Mastic, Coatings, Tapes, and Adhesives: Comply with manufacturer's installation instructions for each type of insulation.

B. Weld Pins:

1. Type: Retainer disk attached to pin, for resistance welding to duct surface after liner is in place.
2. Retainer Disk: Not less than 0.75 square inches.
3. Pin: 0.1 inch shorter than liner thickness. Pins shall not protrude into airstream.
4. Manufacturer: Similar to Duro-Dyne "CP Series Clip-Pins."

C. Stick Pins:

1. Type: Perforated base with protruding pin, for gluing to duct surface prior to application of liner.
2. Pin: 0.25 inches longer than liner thickness.
3. Self-locking Washer: Attaches to pin after application of liner.
4. Manufacturer: Similar to Gemco series PH.

Part 3 - Execution

3.01 GENERAL

A. Prior to installation of insulation, verify that:

1. Ductwork has been tested and approved.
2. Duct seams have been sealed.
3. Duct surfaces are clean and dry.

B. Do not insulate the following:

1. Pre-insulated underground ducts.
2. Ducts constructed of fiberglass duct board, unless otherwise noted.
3. Duct access doors. Tape insulation to duct around duct access door

C. Install products in accordance with manufacturer's recommendations.

D. Install products in accordance with MICA (Midwest Insulation Contractors Association) - National Commercial & Industrial Insulation Standards.

E. Definitions:

1. Outside Air Ducts: Ducts conveying untempered outside air.
2. Tempered Air Ducts: Ducts conveying air within 15 degrees F of conditioned space setpoint temperature.
3. Conditioned space: An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space.

3.02 FIBERGLASS BLANKET INSULATION WITH VAPOR BARRIER

- A. Fully wrap duct, with facing to the outside.
- B. Overlap vapor barrier facing 2 inches minimum at seams and joints.
- C. Seal all seams, joints, and penetrations with foil-faced pressure sensitive tape of same material as insulation facing, to provide a continuous vapor barrier.
- D. On ducts 24 inches or more in width, secure insulation on underside of ducts with stick pins 18 inches maximum on center, 6 inches minimum from edges of duct. Cut pins off flush with washer and seal with vapor barrier tape.

3.03 DUCT LINER

- A. Apply 100 percent coverage of approved adhesive to inside of duct.
- B. Cover interior of duct with liner, with mat coating of liner toward the airstream.
- C. Seams and joints shall be neatly butted, with edges coated with adhesive.
- D. Coat leading edges with adhesive or provide liner with factory-applied edge coating. For duct velocities above 2000 fpm, provide metal nosing around leading edges.
- E. Install weld pins, spaced according to liner manufacturer's instructions, not greater than 18 inches on center or greater than 3 inches from any edge.
- F. Weld pins shall be resistance welded to duct with a machine similar to Duro-Dyne "Pinspotter."

3.04 APPLICATION TO DUCT SYSTEMS

- A. Supply Air Ducts Without Duct Liner, Located Inside Insulated Attic:
 - 1. Insulation Type: Fiberglass Blanket with Vapor Barrier.
 - 2. Insulation Thickness: 1-1/2 inches.
- B. Supply Air Ducts With Duct Liner, Located Inside Insulated Attic:
 - 1. Insulation Type: Duct Liner.
 - 2. Insulation Thickness: 1 inch.
- C. Supply Air Ducts With Duct Liner, Located Outdoors:
 - 1. Insulation Type: Duct Liner.
 - 2. Insulation Thickness: 2 inches.

END OF SECTION

SECTION 23 31 00

DUCTWORK

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals
- C. Section 23 07 00 - Ductwork Insulation
- D. Section 23 33 00 - Ductwork Accessories

1.02 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data)
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Round Ducts	X	X				X		
Flexible Duct		X						
Duct Sealants		X						

Part 2 - Products

2.01 DUCTWORK

- A. Fabrication and Site Delivery:
 - 1. Factory / Shop sealed by blanking or capping duct ends, bagging of small fittings, surface wrapping or shrink wrapping.
- B. Rectangular Supply Ducts:
 - 1. Material: Galvanized steel.
 - 2. Fabricate and support in accordance with:
 - a. Oregon Mechanical Specialty Code, current edition.
 - b. SMACNA HVAC Duct Construction Standards, current edition.
 - 3. Pressure Classification:
 - a. Supply Ducts: 2 inch w.g. positive static pressure.
 - 4. Transverse Joints: In accordance with details in SMACNA HVAC Duct Construction Standards or one of the following proprietary joint systems:
 - a. Ductmate "25" with butyl gasket tape.

- b. Ductmate "35" with butyl gasket tape.
 - c. Lockformer "TDC" with butyl gasket tape.
 - d. Ward Duct Connectors Inc. "WDCI Lite" with butyl gasket tape.
 - e. Ward Duct Connectors Inc. "WDCI Heavy" with butyl gasket tape.
 - f. Spinfinity "AccuFlange."
5. Transverse Joints, Outdoors: SMACNA "T-20" or "T-24" flanged joint or approved proprietary joint system. Outdoor joints shall have continuous cleats for complete coverage of flanges on top and sides of duct. Top cleat shall overhang corners approximately 1/4 inch.
 6. Crossbreaking or Rollbeading:
 - a. Duct panels 16 inches wide and larger shall be rollbeaded or crossbroken, regardless of whether or not duct is lined or insulated.
 - b. Rollbeads shall be 1/8 inch deep, shall be parallel to transverse joints on tops of outdoor ducts, and shall be spaced maximum 12 inches on centers.
 - c. Ducts installed outdoors shall be crossbroken on top panels, to drain water.
 7. Material Thickness:
 - a. Duct gauges shall be determined using tables in SMACNA HVAC Duct Construction Standards, based on duct size, material, pressure class, joint type, and reinforcement spacing.
 - b. "Addendums to SMACNA" and other publications by proprietary joint manufacturers shall not be used for determining material thickness.
 - c. For determining duct gauges using SMACNA tables, proprietary joint systems shall be considered equivalent to the following SMACNA rigidity classes:
 - 1) Lockformer "TDC," 24 gauge: Class "D."
 - 2) Lockformer "TDC," 22 gauge: Class "E."
 - 3) Lockformer "TDC," 20 gauge: Class "F."
 - 4) Lockformer "TDC," 18 gauge, with tie rod(s) on each side of joint: Class "K."
 - 5) Ductmate "25": Class "F."
 - 6) Ductmate "35": Class "J."
 - 7) Ward "WDCI Lite": Class "F."
 - 8) Ward "WDCI Heavy": Class "J."
 - d. Ducts with proprietary joints shall be 24 gauge minimum.
 8. Sealing Requirements: Seal transverse joints and longitudinal seams with tape-and-adhesive or liquid duct sealer, specified herein. Provide at gasketed flanged joints corners or where leaks are detected.
 9. Fittings: Refer to details on Drawings.
- C. Round Supply Ducts:
1. Material: Galvanized steel.
 2. Fabricate and support in accordance with latest editions of:
 - a. Oregon Mechanical Specialty Code
 - b. SMACNA HVAC Duct Construction Standards
 3. Pressure Classification:
 - a. Supply Ducts: 2 inch w.g. positive static pressure, except where noted otherwise on Drawings.
 4. Duct Joints:
 - a. Seams: Longitudinal or spiral, in accordance with SMACNA HVAC Duct Construction Standards. Longitudinal seams shall be spot welded. Snaplock is not acceptable.
 - b. Transverse Joints, except outdoors:
 - 1) Option 1: In accordance with details in SMACNA HVAC Duct Construction Standards "T-25" configuration or one of the following proprietary joint systems:
 - a) Ductmate "35" with DM 440 gasket tape.
 - b) Ductmate "45" with DM 440 gasket tape.
 - c) Ward Duct Connectors Inc. "WDCI Lite" with butyl gasket tape.
 - d) Ward Duct Connectors Inc. "WDCI Heavy" with butyl gasket tape.
 - e) "Spinfinity AccuFlange."
 - 2) Option 2: Slip joints, crimped or expanded.
 - c. Transverse Joints, Outdoors: SMACNA "T-24" flanged joint or approved proprietary joint system. Outdoor joints shall have continuous cleats for complete coverage of flanges on top and sides of duct.

5. Material Thickness: In accordance with tables in SMACNA HVAC Duct Construction Standards, based on duct diameter, duct material, pressure class, and seam type.
 6. Sealing Requirements: Seal transverse joints with tape-and-adhesive or liquid duct sealer, specified herein. Not required for gasketed, flanged joints.
 7. Fittings: Refer to details on Drawings.
- D. Laboratory Fume Exhaust Ducts – Outdoors (and Optional For Indoors):
1. Ducts Included:
 - a. Exhaust ducts with a Stainless Steel (S.S.) designation adjacent to duct size as shown on the drawings.
 2. Material: 18 gauge minimum Stainless Steel (Type 304) with fully welded joints and seams for duct and fittings.
 3. Fabricate and support in accordance with latest editions of:
 - a. Uniform Mechanical Code
 - b. SMACNA HVAC Duct Construction Standards
 4. Pressure Classification: 10 inch w.g. (minimum) pressure class.
 5. Seam Type: Continuous welded longitudinal seam.
 6. Fittings:
 - a. Factory-fabricated by duct manufacturer.
 - b. Continuous welded seams.
 - c. Elbows shall be of die-stamped, pleated, or gored (segmented) construction.
 - d. 90° gored elbows shall be 5 piece.
 - e. 45° gored elbows shall be 3 piece.
 - f. Angled Offsets shall have 3 gores.
 7. Manufacturer: United McGill, Metco, Dee's Sheet Metal, Semco, Arrow, Arjae Sheet Metal, or approved.
- E. Laboratory Fume Exhaust Ducts - Indoor Alternative To Fully Welded Joints:
1. Ducts Included:
 - a. Exhaust ducts with a Stainless Steel (S.S.) designation adjacent to duct size as shown on the drawings.
 2. Duct Joining System:
 - a. Bolted companion ring joining system or with a single fastener band-style clamping system.
 3. Material:
 - a. Rolled end duct flanges with floating stainless steel cast rings, black iron or stainless steel angle rings, as recommended by manufacturer for the duct size.
 - b. Gasket Materials: Gaskets shall be form in place fully expanded PTFE material and a minimum of 1/8" thick. See Thickness shown below:

Joint Diameter	Width	Thickness:
< 12 inch	0.18 inch	0.12 inch
< 24 inch	0.25 inch	0.12 inch
 - c. Bolts, nuts, and washers shall be ASTM A449 grade 5 plated steel.
4. Construction:
 - a. The duct thickness, design and manufacturer shall be in accordance with the latest S.M.A.C.N.A. Industrial Duct Construction Standards requirements for -6.0/+50 inches water column.
 - b. Duct and fittings shall be formed of continuously welded stainless steel.
5. Fittings:
 - a. Factory-fabricated by duct manufacturer.
 - b. Continuous welded seams.
 - c. Elbows shall be of die-stamped, pleated, or gored (segmented) construction.
 - 1) 90° gored elbows shall be 5 piece.
 - 2) 45° gored elbows shall be 3 piece.
 - d. Angled Offsets shall have 3 gores.

6. Manufacturers: Fab-tech Inc Permashield PSP (without Internal coating) represented by Bill Bradford (610-942-9090, bradford@fabtechinc.com), Composites USA Pure Guard II (without Internal coating), Streimer Sheet Metal, or approved.
- F. Laboratory Fume Exhaust Ducts - Flanged Connections To Outdoor Equipment:
1. Option #1:
 - a. Same as "Laboratory Fume Exhaust Ducts - Indoor Alternative To Fully Welded Joints" specified hereinbefore.
 2. Option #2:
 - a. Stainless steel flanges tack welded to stainless steel duct mating with equipment flange bolt pattern. Provide PTFE gasket material as specified for "Indoor Alternative To Fully Welded Joints". Provide cleat over joint to prevent water penetration into joint.
- G. Flexible Duct:
1. Pressure Rating: 6 inch w.g. positive, 1/2 inch w.g. negative.
 2. Core: Steel or aluminum helix bonded to continuous liner.
 3. Insulation: Fiberglass blanket between core and outer jacket.
 4. Thermal Conductance: 0.24 btuh/sq ft/deg. F max.
 5. Vapor Barrier Outer Jacket: Seamless polymer.
 6. Connect and support in accordance with latest editions of:
 - a. Oregon Mechanical Specialty Code
 - b. SMACNA HVAC Duct Construction Standards
 7. U.L. Listing: U.L. 181 Class 1 Air Duct.
 8. Manufacturer:
 - a. Flexmaster Type 3
 - b. ATCO UPC #070
 - c. Thermaflex G-KM
 - d. Hart & Cooley F114
- H. Liquid Duct Sealer, Indoors:
1. U.L. Classification: Flame spread rating not to exceed 25; smoke developed rating not to exceed 50; when applied in a 2 inch wide strip at a thickness of 0.0032 inch.
 2. Low-Emitting Material: Volatile organic compound (VOC) content less than 30 grams per liter for metal-to-metal bonding per SCAQMD Rule #1168.
 3. Application Temperature Limits: 40 to 110 deg. F.
 4. Manufacturer: United McGill Corp., Accumetric, Vulkem, Carlisle Hardcast, Alcoa, Design Polymeric, Miracle Adhesives, Ductmate, or approved. Similar to Accumetric Boss 350.
- I. Tape-and-Adhesive Duct Sealer, Indoors:
1. U.L. Classification: Flame spread rating not to exceed 25; smoke developed rating not to exceed 50; when applied in a 2 inch wide strip at a thickness of 0.0032 inch.
 2. Application Temperature Limits: 30 to 110 deg. F.
 3. Manufacturer:
 - a. Hardcast Inc. DT tape with FTA-20 adhesive
 - b. United McGill MDT6-300 tape with MTA-20 adhesive
- J. Tape-and-Adhesive Duct Sealer, Outdoors:
1. Application Temperature Limits: 30 to 110 deg. F.
 2. Manufacturer:
 - a. Hardcast Inc. DT tape with RTA-50 adhesive
 - b. United McGill MDT6-300 tape with MTC-50 adhesive
- K. Fume Hood Exhaust Duct Connection Liquid Sealer:
1. Dow Corning Number 730 solvent resistant sealant.

Part 3 - Execution

3.01 GENERAL

- A. Install products in accordance with manufacturer's recommendations.
- B. Provide duct fittings and offsets not shown on Drawings, if required for coordination with the work of other sections.
- C. Install products in accordance with Manufacturer's recommendations and standards referenced herein.
- D. Duct sizes on Drawings are net inside dimensions, measured to inside face of internal liner or internal insulation.
- E. Fabricate and install ductwork to minimize gaps. Gaps in sheetmetal shall be no larger than allowed for sealant per sealant manufacturer's installation instructions.

3.02 DUCT AND FITTING HANDLING

- A. Delivery to Site:
 - 1. At site, sealed ends shall be visually examined and resealed as required.
- B. Storage:
 - 1. Store away from high dust generating processes.
 - 2. Provide pallets or blocking to keep above floor.
 - 3. Provide temporary cover to protect stored material.
- C. Installation:
 - 1. Protective coverings shall be removed immediately before installation and inspected to determine if wipe down is necessary.
 - 2. During construction, provide temporary sealing of openings into duct systems, to prevent accumulation of dust in ducts.
 - 3. Open ends of completed duct and overnight work-in-progress shall be sealed.

3.03 DUCT SEALANTS

- A. Clean duct surfaces prior to applying sealant.
- B. Prior to application, verify that ducts are dry and within specified temperature limits.
- C. Inspect after first application of sealant to identify areas where shrinkage has occurred. Fill voids with a second application.

3.04 FLEXIBLE DUCT

- A. Installation to conform to SMACNA HVAC Duct Construction Standards.
- B. Maximum Length: 6 feet, unless noted otherwise on Drawings.
- C. Limitations to Use: Flexible duct shall not be substituted for round or rectangular duct indicated on Drawings. Flexible duct is acceptable only where shown on Drawings.
- D. Connections to Collars: Secure core with stainless steel or nylon drawband under the insulation. Secure vapor barrier with an additional stainless steel or nylon drawband outside of insulation.

3.05 DUCT LEAKAGE TESTING

- A. Ducts Included: Entire length of new fume exhaust duct system from fan inlet to grilles or fume hoods.

- B. Test Conditions:
1. Test pressure:
 - a. Fume Exhaust System: 2" inches w.g.
 - b. Allowable leakage: Less than 1% of total system exhaust air.
 2. Test Procedure:
 - a. Test in accordance with SMACNA HVAC Air Duct Leakage Test Manual.
 - b. If leakage rate is exceeded in initial test, reseal ductwork and repeat test procedure until requirements are met.
 - c. Final test to be witnessed by owner's representative. Notify owner's representative one (1) week in advance of final test.
 - d. Submit final test report for approval.
 - e. Provide approved test report with Operations and Maintenance manual.

END OF SECTION

SECTION 23 33 00

DUCTWORK ACCESSORIES

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals
- C. Section 23 31 00 - Ductwork

1.02 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data), including documentation of ORS 453.005 (7) (e) compliance.
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Volume Dampers		X						
Turn Vanes		X						
Silencer	X	X		X				

Part 2 - Products

2.01 VOLUME DAMPERS

- A. Volume Dampers, up to 10 inch width, internally lined or uninsulated ducts:
 - 1. Blade: Minimum 22 ga. galvanized steel, stainless steel for stainless steel ducts.
 - 2. Regulator: Quadrant type, 1/4 inch square shaft, hex nut lock, indicator dial marked "open" and "shut".
 - 3. Bearings: 1/4 inch square shaft, spring-lock on tail bearing.
 - 4. Regulator/Bearing Set Manufacturer: Duro-dyne SRHS-148, or approved.
- B. Volume Dampers, up to 10 inch width, externally insulated ducts:
 - 1. Blade: Minimum 22 ga. galvanized steel.
 - 2. Regulator: Quadrant type, 1/4 inch square, hex nut lock, indicator dial marked "open" and "shut", 1-1/2 inch standoff bracket.
 - 3. Bearings: 1/4 inch square shaft, spring-lock on tail bearing.
 - 4. Regulator/Bearing Set Manufacturer: Duro-dyne SRST 1-1/2-148 standoff with SRHS-148 regulator, or approved.

- C. Volume Dampers, 11 inch to 20 inch width, internally lined or uninsulated ducts:
 1. Blade: Minimum 18 ga. galvanized steel, stainless steel for stainless steel ducts. Use multiple blades for height over 12 inches.
 2. Regulator: Quadrant type, 3/8 inch square shaft, hex nut lock, indicator dial marked "open" and "shut".
 3. Bearings: 3/8 inch square shafts, spring-lock on tail bearing.
 4. Regulator/Bearing Set Manufacturer: Duro-dyne SRHS-388, or approved.
- D. Volume Dampers, 11 inch to 20 inch width, externally insulated ducts:
 1. Blade: Minimum 18 ga. galvanized steel. Use multiple blades for height over 12 inches.
 2. Regulator: Quadrant type, 3/8 inch square shaft, hex nut lock, indicator dial marked "open" and "shut", 1-1/2 inch standoff bracket.
 3. Bearings: 3/8 inch square shafts, spring-lock on tail bearing.
 4. Regulator/Bearing Set Manufacturer: Duro-dyne SRST 1-1/2-388 standoff with SRHS-388 regulator, or approved.
- E. Volume Dampers, 21 inch to 30 inch width, internally lined or uninsulated ducts:
 1. Blade: Minimum 16 ga. galvanized steel, stainless steel for stainless steel ducts. Use multiple blades for height over 12 inches.
 2. Regulator: Quadrant type, 1/2 inch square shaft, hex nut lock, indicator dial marked "open" and "shut".
 3. Shafts: 1/2 inch square, each end.
 4. End Bearing: Cast alloy, 1/2 inch square shaft size.
 5. Regulator/Bearing Set Manufacturer: Duro-dyne SRHS-128 regulator and SB-112 end bearing, or approved.
- F. Volume Dampers, 21 inch to 30 inch width, externally insulated ducts:
 1. Blade: Minimum 16 ga. galvanized steel. Use multiple blades for height over 12 inches.
 2. Regulator: Quadrant type, 1/2 inch square shaft, hex nut lock, indicator dial marked "open" and "shut", 1-1/2 inch standoff bracket.
 3. Shafts: 1/2 inch square, each end.
 4. End Bearing: Cast alloy, 1/2 inch square shaft size.
 5. Regulator/Bearing Set Manufacturer: Duro-dyne SRST 1-1/2-128 standoff with SRHS-128 regulator and SB-112 end bearing, or approved.
- G. Volume Dampers, over 30 inch width:
 1. Blade: Minimum 16 ga. galvanized steel, with stiffeners as required. Stainless steel for stainless steel ducts. Use multiple blades for height over 12 inches.
 2. Regulator: Quadrant type, 1/2 inch square shaft size, wing nut lock, indicator dial marked "open" and "shut".
 3. Shaft: 1/2 inch square, continuous across damper width.
 4. End Bearing: Cast alloy, 1/2 inch square shaft size.
 5. Regulator/Bearing Set Manufacturer: Duro-dyne K-5 regulator and SB-112 end bearing, or approved.

2.02 TURN VANES

- A. Turn Vanes, 20 inch and less duct width:
 1. Arrangement: Stationary vanes fixed to side rails installed in 90 degree square elbows.
 2. Vane and Rail Material: Galvanized steel.
 3. Vanes: Double wall, minimum 26 gauge, 90 degree, 2-inch throat radius.
 4. Rails: Minimum 24 gauge, 1-1/2 inch on center vane spacing.
 5. Manufacturer: Durodyne, Ductmate, Hardcast, Ward Industries, Cain, or approved. Similar to Durodyne Junior Vane Rail JVR2.
- B. Turn Vanes, greater than 20 inch duct width:
 1. Arrangement: Stationary vanes fixed to side rails installed in 90 degree square elbows.
 2. Vane and Rail Material: Galvanized steel.
 3. Vanes: Double wall, minimum 24 gauge, 90 degree, 4-1/2 inch throat radius.

4. Rails: Minimum 24 gauge, 3-1/4 inch on center vane spacing.
5. Manufacturer: Durodyne, Ductmate, Hardcast, Ward Industries, Cain, or approved. Similar to Durodyne Vane Rail VR2.

2.03 TUBULAR DUCT SILENCER IN FUME EXHAUST DUCT (S-1)

- A. Silencer Application: Tubular style with acoustic fill lined with chemical resistant material for use with chemical laboratory fume hood exhaust air.
- B. Outer Casing: Square 22 gauge G90 galvanized outer casing suitable for outdoor use
- C. Internal Liner: 22 gauge G90 galvanized suitable for outdoor use with internal chemical resistant liner specified hereafter. Liner shall be perforated steel and shall be acoustically transparent.
- D. Baffle Fill: Inorganic glass fiber acoustic material fill with liner specified hereafter. Glass fiber packed under 5% compression to eliminate voids due to settling.
- E. Pod Construction: Pods constructed as full length center bullet within silencer. Pod attached to silencer body in radial fashion with 4 supports, 90 degrees apart to insure stability.
- F. Flange: Body shall extend for 1 1/2" flange past silencer. Flange shall be solid or bored with bolt holes at factory, at contractor's option.
- G. Construction: Silencer constructed using Pittsburgh Lock Seam sheet metal construction. Sound attenuators capable of withstanding a differential air pressure of 8" w.g. Airtight construction shall be provided by use of a duct sealing compound on the job sit. Contractor shall supply material and labor.
- H. Assembly: Factory shall assemble silencer and accessories and furnish as a single unit.
- I. Accessories:
 1. Lining: Acoustic fill lined with Tedlar PVF to provide chemical resistant protection from chemicals in fume exhaust.
 2. Capped Ends: Silencers provided with capped ends to prevent contamination during delivery to job site and at job site.
- J. Performance:

Silencer Face Velocity (fpm)	Net Insertion Loss Rating								
	Static Pressure Drop (ins w.g.)	1	2	3	4	5	6	7	8
		63	125	250	500	1000	2000	4000	8000
-2000	0.18	11	14	24	40	46	41	29	17
2000	0.18	9	14	23	33	42	42	30	21

- K. Silencer Size: 20" inner diameter to match connecting stainless steel duct, 40" minimum length.
- L. Maximum Allowable Pressure Drop: 0.10 inches w.g. with 2,600 cfm exhaust design flow.
- M. Manufacturers: Ruskin, Vibro-Acoustics, IAC, TranSonic Inc., Commercial Acoustics, Aerosonics, Semco, DynaSonic DSI, or approved. Similar to Ruskin Tubular silencer model AXA.

Part 3 - Execution

3.01 GENERAL

- A. Install products in accordance with manufacturer's recommendations.

3.02 DUCT SILENCERS

- A. Open ends of sound traps shall be capped at the factory to prevent entrance of dirt, water, or other debris. Caps shall remain in place until unit is installed.
- B. If duct transitions are required to adapt silencer dimensions to installed ductwork dimensions, the contractor shall provide the required hardware and labor.
- C. Provide a flanged connection of ductwork to silencer using PTFE gasket specified in Section 23 31 00 Ductwork.

END OF SECTION

SECTION 23 34 00

FANS

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals
- C. Section 20 42 00 - Seismic Restraints

1.02 REFERENCES

- A. AMCA Publication 99, "Standards Handbook"
- B. ANSI/AMCA Standard 210-99, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating"
- C. AMCA Publication 211-05, "Certified Ratings Program - Product Rating Manual for Fan Air Performance"
- D. AMCA Standard 300-05, "Reverberant Room Method for Sound Testing of Fans"
- E. AMCA Publication 311-05, "Certified Ratings Program"
- F. AMBA Method of Evaluating Load Ratings of Bearings ANSI-11 (r1999)
- G. ANSI/AMCA Standard 204-05, "Balance Quality and Vibration Levels for Fans"
- H. AMCA Standard 500-D-07, "Laboratory Methods of Testing Dampers for Rating"
- I. AMCA Standard 500-L-07, "Laboratory Methods of Testing Louvers for Rating"
- J. SMACNA - Medium Pressure Plenum Construction Standard
- K. ANSI Z9.5 – Laboratory Design
- L. ASHRAE - Laboratory Design Guide

1.03 QUALITY ASSURANCE

- A. Performance ratings: Conform to AMCA standard 210 and 300. Fans must be tested in accordance with AMCA 210 and 300 in an AMCA accredited laboratory.
- B. Classification for Spark Resistant Construction shall conform to AMCA 99.
- C. Each fan shall be vibration tested before shipping, as an assembly, in accordance with AMCA 204-05. Each assembled fan shall be test run at the factory at the specified fan RPM and vibration signatures shall be taken on each bearing in three planes - horizontal, vertical, and axial. The maximum allowable fan vibration shall be less than 0.10 in./sec peak velocity; filter-in reading as measured at the fan RPM. This report shall be provided at no charge to the customer upon request.
- D. Provide one (1) year from startup or eighteen (18) months from shipment, whichever occurs first.

1.04 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Provide dimensional drawings and product data of high-plume laboratory exhaust fan assembly.
- C. Provide fan curves for fan at the specified operation point with the flow, static pressure and horsepower clearly plotted.
- D. Provide venturi/nozzle velocity of exhaust fan, total exhaust flow, and discharge plume rise at specified wind velocity
- E. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data)
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
High-Plume Dilution Laboratory Exhaust Fan	X	X	X	X				X

Part 2 - Products

2.01 HIGH-PLUME DILUTION LABORATORY EXHAUST SYSTEM (FEF-2)

- A. Basis of Design and Substitutions: The project design is based on the basis of design manufacturer's model scheduled on the drawings and specified herein. Equipment representatives and contractors shall verify that a substituted manufacturer's unit meets the minimum performance requirements, electrical services requirements and fits within the space constraints shown on the drawings. Additional costs arising from changes needed to the design to accommodate the substituted unit, as well as coordination of these changes with other Divisions, shall be the responsibility of the Division 23 contractor.
- B. General
 - 1. Weatherproof fan system suitable for outdoor installation on grade slab.
 - 2. Fan performance to be based on standard conditions (density 0.075 Lb./ft3).
 - 3. Fan to be equipped with lifting lugs.
 - 4. Fasteners exposed to corrosive exhaust shall be stainless steel.
 - 5. Curb cap shall be corrosion resistant material or hot rolled steel coated with corrosion resistant coating.
 - 6. Fan assembly shall be designed for a minimum of 125 mph wind loading without the use of guy wires.
- C. Factory Run Test
 - 1. Fan shall be completely assembled and test run as a unit at the specified operating speed prior to shipment. Each wheel shall be statically and dynamically balanced in accordance with ANSI/AMCA 204-96 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings shall be taken by electronic type equipment in the axial, vertical, and horizontal directions on each of the bearings. Records shall be maintained and a written copy shall be available upon request.

- D. Corrosion Resistant Coating
1. All fan and system components including fan, venturi/nozzle and plenum shall be constructed of corrosion resistant material or coated with a two part electrostatically applied and baked, corrosion resistant coating system suitable for exhausting general chemistry fume hoods.
- E. Fan Housing and Outlet
1. Fan housing to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
 2. Fan housing shall be bifurcated, allowing all drive components, including the motor, to be serviced without contact of the contaminated airstream.
 3. Fan housing material or corrosion protective coating shall be resistant to degradation by Ultra Violet component of the sunlight.
 4. A high velocity discharge venturi or nozzle shall be supplied by the fan manufacturer designed to efficiently handle an outlet velocity of up to 7000 FPM.
 5. An integral fan housing and mixing plenums drains shall be used to drain rainwater when the fan is de-energized.
 6. A bolted & gasketed access door shall be supplied for impeller inspection and service.
 7. Fan assembly shall be AMCA type B spark resistant construction minimum.
 8. Totally enclosed belt guard shall enclose motor sheave and V-belt drives.
- F. Exhaust Stack Extension: If necessary, provide an exhaust stack extension with sufficient length to achieve the required "Effective Plume Height" of 30 ft.
- G. Fan Impeller:
1. Fan impeller shall be mixed flow design with non-stall characteristics. The impeller shall be electronically balanced both statically and dynamically exceeding AMCA Standards.
 2. Fan impeller shall be manufactured of welded and coated steel with corrosion resistant coating.
- H. Bypass Air Mixing Plenum:
1. A bypass air plenum shall be provided with manual bypass air damper for introducing outside air at the grade level upstream of the fan complete with bypass air weatherhood and bird screen.
 2. For Side Inlet Condition:
 - a. Provide a vortex breaker or straightening vanes in the mixing plenum to reduce air turbulence into the fan inlet that can compromise fan performance.
 - b. Provide punched inlet flanges for duct attachment.
 3. The bypass air plenum shall be mounted on factory fabricated roof curb provided by the fan manufacturer.
 4. Bypass air damper shall be opposed-blade design with jamb seals and polymer edge seals.
 5. Damper shall be provided with locking handle to allow manual field adjustment of bypass airflow by the balancing contractor.
 6. Damper blade drive linkage shall be set by manufacturer and secured to eliminate linkage slippage. Damper access and service shall be performed outside of the contaminated airstream.
 7. Fan isolation dampers: Not required. Single fan operates on a continuous 24 hr schedule.
 8. Blower/Plenum vibration isolation: Not required. Fan assembly to rest on gasketed curb.
- I. Bypass Air Mixing Plenum Curb
1. Provide a structural roof support curb for the mixing plenum. Plenum will be seismically anchored to a 6" concrete base on grade.
 2. Curb height to be 18" minimum to achieve the required 30 ft "Effective Plume Height".
 3. Curb shall be fabricated of a minimum of 12 gauge corrosion-resistant coated steel and structurally reinforced.
 4. When properly anchored to the concrete slab, the standard curb / plenum / blower assembly shall withstand wind loads of up to 125 mph without additional structural support or guy wires.

- J. Fan Motor and Drive
 - 1. Motors shall be premium efficiency Inverter style for use with a variable frequency drive , standard NEMA frame, TEFC with a 1.15 service factor.
 - 2. Provide factory wired shaft grounding of the motor shaft.
 - 3. A factory-mounted NEMA 3R disconnect switch shall be provided and factory wired with fan.
 - 4. Motor maintenance shall be accomplished without fan or fan impeller removal, or requiring maintenance personnel to access the contaminated exhaust components.
 - 5. Motor mounting shall be foot mount.
 - 6. Motor sheaves shall be cast iron, variable pitch on applications 10 HP and smaller.
 - 7. Drive arrangements requiring access and handling of hazardous and contaminated fan components are not acceptable.
 - 8. Fan shaft to be turned and polished steel material coated with corrosion resistant coating.
 - 9. Fan shaft bearing shall be ball or roller pillow block type and sized for an L-10 life of no less than 200,000 hours.
 - 10. All shaft bearings and non-permanently lubricated motors shall have nylon extended lube lines with zerk fittings.
 - 11. Motor, coupling, and bearing shall all be outside the contaminated exhaust, and be capable of replacement without disassembling fan and accessing hazardous and contaminated fan components.

- K. Performance and Plume Height Requirements: Refer to schedule on Drawings.

- L. Manufacturer: Twin City Fan and Blower Model QFE, Greenheck Vektor-MH Belt Drive High Plume Blower, Strobic Tri-Stack, or approved.

Part 3 - Execution

3.01 GENERAL

- A. Install products in accordance with manufacturer's recommendations.
- B. Pipe housing drain as directed on the drawings.
- C. Do not operate fans during construction unless authorized by the owner's representative.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals
- C. Section 20 91 00 - Testing, Adjusting, and Balancing

1.02 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
 - 1. Shop Drawings (submittal data)
 - 2. Product Data (submittal data), including documentation of ORS 453.005 (7) (e) compliance.
 - 3. Manufacturer's Operation Manuals
 - 4. Manufacturer's Service and Lubrication Requirements
 - 5. Service Contracts and Field Start-up Reports
 - 6. Cleaning, Certification, and Test Reports
 - 7. System Information
 - 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Grilles	X	X						
Diffusers	X	X						

Part 2 - Products

2.01 GRILLES, REGISTERS, AND DIFFUSERS

- A. General:
 - 1. Refer to Drawings for types, neck sizes, and blow patterns.
- B. Supply Diffuser Ceiling (SDC-1):
 - 1. Type: Adjustable curved louver vanes, surface mounted.
 - 2. Material: Aluminum or steel.
 - 3. Face: Rectangular or square as shown on drawings.
 - 4. Pattern Deflectors: Adjustable curved louver vanes.
 - 5. Blow Pattern: 4-way, 3-way, 2-way, or 1-way, as indicated on Drawings.
 - 6. Frame Type: For cut-in surface mount.
 - 7. Neck: Rectangular or Square neck as indicated on the Drawings. Contractor to provide square-to-round transition for attaching round ductwork to the diffuser.
 - 8. Finish: White.
 - 9. Fastening: Countersunk screw holes with factory painted oval head screws.
 - 10. Manufacturer: Price, Titus, Krueger, Carnes, or approved. Similar to Price CVD.

- C. Exhaust Grille Ceiling (EGC-1):
 - 1. Type: Perforated face, surface mounted.
 - 2. Material: Aluminum or steel.
 - 3. Face: Perforated with a core free area of approximately 50%.
 - 4. Frame Type: For cut-in surface mounting.
 - 5. Neck: Rectangular or Square neck as indicated on the Drawings.
 - 6. Finish: White.
 - 7. Fastening: Countersunk screw holes with factory painted oval head screws.
 - 8. Manufacturer: Price, Titus, Krueger, Carnes, or approved. Similar to Price 10 Series

Part 3 - Execution

3.01 GENERAL

- A. Install products in accordance with manufacturer's recommendations.
- B. Secure grilles and registers with flat head, countersunk screws, flush with borders, painted to match borders. Hex head and/or bright finish screws are not acceptable.
- C. Install outlets and inlets tight to mounting surfaces.
- D. Install outlets and inlets plumb and square with walls and ceilings.

END OF SECTION

SECTION 23 74 10

PACKAGED MAKE-UP AIR UNITS

Part 1 - General

1.01 RELATED SECTIONS

- A. Section 20 10 00 - General Mechanical Provisions
- B. Section 20 20 00 - Mechanical Operation and Maintenance Manuals
- C. Section 20 42 00 - Seismic Restraints

1.02 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AMCA 99—Standards Handbook
- C. AMCA 210—Laboratory Methods of Testing Fans for Rating Purposes
- D. AMCA 500—Test Methods for Louver, Dampers, and Shutters.
- E. AHRI 340/360 - Unitary Large Equipment
- F. NEMA MG1—Motors and Generators
- G. National Electrical Code.
- H. NFPA 70—National Fire Protection Agency.
- I. SMACNA—HVAC Duct Construction Standards—Metal and Flexible.
- J. UL 900—Test Performance of Air Filter Units.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept products on site and inspect for damage.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.04 SHOP DRAWINGS, PRODUCT DATA, OPERATION & MAINTENANCE DATA

- A. Submittals required for the products listed in the Product Table, in accordance with Section 20 10 00. Operation & Maintenance Information required as indicated in the Product Table in accordance with Section 20 20 00.
- B. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.
- C. Product Data:
 - 1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.
 - 2. Provide computer generated fan curves with specified operating point clearly plotted.
 - 3. Manufacturer's Installation Instructions.

- D. Operation & Maintenance Information requirements indicated by number designation as follows. Refer to Section 20 20 00 for a description of each type of information.
1. Shop Drawings (submittal data)
 2. Product Data (submittal data), including documentation of ORS 453.005 (7) (e) compliance.
 3. Manufacturer's Operation Manuals
 4. Manufacturer's Service and Lubrication Requirements
 5. Service Contracts and Field Start-up Reports
 6. Cleaning, Certification, and Test Reports
 7. System Information
 8. Warranties

PRODUCT TABLE	Operation & Maintenance Information							
	1	2	3	4	5	6	7	8
Make-Up Air Unit	X	X	X	X	X		X	X

1.05 QUALITY ASSURANCE

- A. Products shall comply with the requirements of Oregon Revised Statute (ORS) 453.005 (7) (e), effective January 1, 2011. The referenced statute limits the use of three types of brominated fire retardant chemicals, which are defined as hazardous substances.
- B. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.
- C. Startup must be done by trained personnel experienced with rooftop equipment.
- D. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.

Part 2 - PRODUCTS

2.01 MAKE-UP AIR UNITS (MAU-1)

- A. Basis of Design and Substitutions: The project design is based on the basis of design manufacturer's model scheduled on the drawings and specified herein. Equipment representatives and contractors shall verify that a substituted manufacturer's unit meets the minimum performance requirements, electrical services requirements and fits within the space constraints shown on the drawings. Additional costs arising from changes needed to the design to accommodate the substituted unit, as well as coordination of these changes with other Divisions, shall be the responsibility of the Division 23 contractor.
- B. General Unit Requirements: Factory assembled, weatherproof outdoor unit with integral controls delivering a constant volume of 100% outside air at a fixed "space neutral" discharge air temperature that is manually adjustable, with change-over temperature and reset schedule programmed at the unit controller. The unit will provide make-up air for new fume hood exhaust in two existing laboratories.
- C. Unit Description
 1. Configuration:
 - a. 100% Outside air intake section
 - b. Filter section
 - c. DX Cooling coil section
 - d. Supply fan section
 - e. Gas heating section.
 - f. Condensing unit section

2. The complete unit shall be cETLus listed.
3. Each unit shall be specifically designed for outdoor application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Units shall be shipped fully charged with R-410 Refrigerant and oil.
4. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection. Factory test log shall be made available upon request.
5. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.
6. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.
7. Warranty: The manufacturer shall provide 12-month parts warranty. Defective parts shall be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

D. Cabinet, Casing and Frame

1. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0, and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.
2. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 750-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.
3. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
4. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

E. Filters

1. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" pre-filter and a 4" final filter. The unit design shall have a hinged access door for the filter section.
2. Provide two (2) sets of filters: Merv 7, 2" pre-filter and Merv 13, 4" final filter. One set provided with unit and one set delivered to the owner.
3. Contractor or manufacturer to provide magnehelic gauge in weather-tight enclosure on outside of unit for filter load monitoring:
 - a. Filter Gauge:
 - 1) Filter gauge shall be field mounted on the filter access side piped with copper tubing around filter bank.
 - 2) Type: Magnehelic.
 - 3) Manufacturer: Dwyer, Cleveland Draft Gauge, Farr, or approved. Similar to Dwyer series 2001-ASF (adjustable signal flag).

F. Cooling Coil

1. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

2. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
 3. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.
 4. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.
 5. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.
- G. Hot Gas Reheat
1. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser
 2. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
 3. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller.
 4. During a Hot Gas Reheat mode, the unit shall be capable of 100% of the cooling capacity.
 5. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.
 6. Each coil shall be factory leak tested with high-pressure air under water.
- H. Supply Fan
1. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft.
 2. Fan assembly shall be a slide out assembly for servicing and maintenance.
 3. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.
 4. The fan motor shall be a totally enclosed EC motor that is speed controlled by the unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
 5. The supply fan shall operate as a constant volume fan initially but shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow in the future. The fan shall not operate in a state of surge at any point within the modulation range.
- I. Heating Section
1. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.
 2. Each module shall have two stages of heating control. The module shall be complete with furnace controller and control valve capable of 5:1 modulating operation.
 3. The heat exchanger tubes shall be constructed of stainless steel.
 4. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
 5. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.

6. The factory-installed DDC unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

J. Condensing Section

1. Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.
2. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 0~125°F. Mechanical cooling shall be provided to 25° F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.
3. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.
4. The unit shall have scroll compressors. One of the compressors shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature.
5. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.
6. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.
7. Each circuit shall be dehydrated and factory charged with R-410A Refrigerant and oil.

K. Electrical

1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.
2. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.
3. Provide a 120 Volt service outlet wired ahead of the disconnect switch.

L. Controls

1. Control Sequence and Programming Requirements: See Part 3 Execution hereafter.
2. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

3. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.
4. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
5. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip
6. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to insure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.
7. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:
 - a. Return air temperature
 - b. Discharge air temperature
 - c. Outdoor air temperature
 - d. Space air temperature
 - e. Outdoor enthalpy, high/low
 - f. Compressor suction temperature and pressure
 - g. Compressor head pressure and temperature
 - h. Expansion valve position
 - i. Condenser fan speed
 - j. Inverter compressor speed
 - k. Dirty filter indication
 - l. Airflow verification
 - m. Cooling status
 - n. Control temperature (Changeover)
 - o. VAV box output status
 - p. Cooling status/capacity
 - q. Unit status
 - r. All time schedules
 - s. Active alarms with time and date
 - t. Previous alarms with time and date
 - u. Optimal start
 - v. Supply fan and exhaust fan speed
 - w. System operating hours
 - x. Fan
 - y. Exhaust fan
 - z. Cooling
 - aa. Individual compressor
 - bb. Heating
 - cc. Economizer
 - dd. Tenant override
8. The user interaction with the keypad shall provide the following:
 - a. Controls mode:
 - 1) Off manual

- 2) Auto
 - 3) Heat/Cool
 - 4) Cool only
 - 5) Heat only
 - 6) Fan only
 - b. Occupancy mode:
 - 1) Auto
 - 2) Occupied
 - 3) Unoccupied
 - 4) Tenant override
 - c. Unit operation changeover control:
 - 1) Return air temperature
 - 2) Space temperature
 - 3) Network signal
 - d. Cooling and heating change-over temperature with deadband
 - e. Cooling discharge air temperature (DAT)
 - f. Supply reset options:
 - 1) Return air temperature
 - 2) Outdoor air temperature
 - 3) Space temperature
 - 4) Airflow (VAV)
 - 5) Network signal
 - 6) External (0-10 vdc)
 - 7) External (0-20 mA)
 - g. Temperature alarm limits:
 - 1) High supply air temperature
 - 2) Low supply air temperature
 - 3) High return air temperature
 - h. Lockout control for compressors
 - i. Compressor interstage timers
 - j. Night setback and setup space temperature
 - k. Building static pressure.
 - l. Economizer changeover
 - 1) Enthalpy
 - 2) Drybulb temperature
 - m. Currently time and date
 - n. Tenant override time
 - o. Occupied/unoccupied time schedule
 - p. One event schedule
 - q. Holiday dates and duration
 - r. Adjustable set points
 - s. Service mode
 - 1) Timers normal (all time delays normal)
 - 2) Timers fast (all time delays 20 sec)
 - 9. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be capable of being controlled between a minimum and a maximum discharge air temperature (DAT) based on any one of the following inputs:
 - a. Airflow
 - b. Outside air temperature
 - c. Space temperature
 - d. Return air temperature
 - e. External signal of 1-5 vdc
 - f. External signal of 0-20 mA
 - g. Network signal
- M. Roof Curb:
- 1. Not required. Unit will be supported on a concrete base at grade.

- N. Minimum Performance and Electrical Requirements: See schedule on drawings.
- O. Approved Manufacturers:
 - 1. Daikin Applied, Greenheck RV, or approved. Similar to Daikin Applied Rebel Single zone Heating and Cooling Unit model DPS.

Part 3 - Execution

3.01 GENERAL

- A. Install products in accordance with manufacturer's recommendations.

3.02 MAKE-UP AIR UNITS

- A. Start-up and Commissioning: Unit manufacturer shall provide a factory authorized technician to start and commission the units and systems prior to final air balance. Submit certification report with Operation and Maintenance manual.
- B. Control Sequence and Programming Requirements by factory authorized technician. The unit shall be controlled using the factory unit controller as follows. Technician to optimize setpoints and settings to provide stable temperature control:
 - 1. Unit Controls:
 - a. Head Pressure Control Condenser control: The condenser head pressure will be monitored by the unit controller to maintain head pressure and the compressor operating envelope at all times to avoid high pressure trips on high load days. ECM motors to be provided as well as factory sensor to provide this protection.
 - b. Compressor Envelope Control: The unit controller will continually monitor the suction and discharge pressure and temperature conditions during compressor operation. The unit will modulate the compressor, condenser head pressure, and electronic expansion valve to maintain a safe compressor operating conditions to add reliability, and limit unit shut down during fringe operating conditions, like high head pressure or low suction conditions on design day operation.
 - c. Change Over Setpoints: The unit change over source temperature is the Outdoor air temperature (OAT) and will drive the change of unit states. The unit state will change from cooling, fan only or heating based on the change over heating or cooling setpoints.
 - d. Change Over Startup Settings
 - i. Source OAT
 - ii. Cooling setpoint=72F OAT
 - iii. Heating setpoint=60F OAT
 - iv. Fan only= 60<OAT<72F
 - 2. Supply Fan: The supply fan will be factory supplied with a Direct Drive Electrically commutated motor (ECM)
 - a. CAV: The Supply Fan will operate continuously.
 - 3. Heating Mode: The unit in heating will operate to supply a heating discharge air temperature set point adjustable at the unit controller.
 - a. Gas Heat: Modulating Gas Heat: The modulating gas heat will be modulated by the unit controller to maintain the heating DAT set point.
 - b. Start-Up settings: Heating DAT setpoint=72F
 - c. Heating DAT reset: The heating DAT setpoint to be reset by OAT. A linear relationship between the DAT and the reset variable will be created for the minimum and maximum DAT setpoints. As the reset variable changes the DAT will adjust according to the relationship.
 - d. Reset Start-Up settings:
 - i. Source: OAT
 - ii. Linear Scale:
 - 1. Heating DAT setpoint=72F @OAT=60F
 - 2. Heating DAT setpoint=76F @OAT=40 F

- 4. Cooling Mode:
 - a. Discharge Air Control: In the cooling mode, the unit capacity will modulate the variable speed compressor to maintain the unit cooling discharge air set point. The cooling DAT set point will be adjustable at the unit controller. Unit capacity will be modulated by the variable speed compressor operation.
 - b. Start-Up Settings: Cooling DAT Set Point= 68 F
- 5. Dehumidification/Reheat:
 - a. Reheat Always: A neutral DAT will be provided in the Cooling and Fan only modes by setting the reheat control to always. The unit will control the compressors to maintain the minimum leaving coil temperature/dewpoint and the reheat coil to provide the cooling DAT setpoint at approximately "neutral" space temperature conditions.
 - b. Start-up settings
 - i. Reheat method=Always
 - ii. LCT setpoint=57F
- C. Curb and Seismic Restraint:
 - 1. Refer to Architectural Drawings for concrete base details.
 - 2. Units will be seismically restrained to concrete base. Provide additional hardware necessary to accomplish the restraining method of attachment determined by Section 20 42 00 Seismic Restraints.
 - 3. Coordinate concrete base size with the installing contractor.
- D. This section shall provide any additional field assembly and electrical wiring of unit components not provided by the unit manufacturer.
- E. Install unit level to facilitate coil condensate drainage.

END OF SECTION

SECTION 26 01 00

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 complimentary 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.
- E. Use of the word "Provide" shall be equivalent to "Furnish and Install."

1.02 SECTION INCLUDES

- A. General requirements specifically applicable to Division 26 sections, which apply in addition to Division 1 - General Requirements.

1.03 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.

1.04 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 diagramed 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.
- C. Where any device or part of equipment is referred to in these specifications in the singular number (such as "the switch"), such reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.05 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. Installation 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 UL.
 - 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.

1.06 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 72E - Electrical Safety in Workplace.
 - d. NFPA 101 - Life Safety Code.
 - e. NFPA 110 - Emergency and Standby Power Systems.
 - f. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
 3. State of Oregon Electrical Specialty 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.
 12. Telecommunications Industries Association (TIA).
 13. Electronics Industries Alliance (EIA).
 14. Federal Communications Commission (FCC).
 15. Institute of Electrical and Electronics Engineers (IEEE).
 16. Building Industry Consulting Service International (BICSI).

1.07 SUBMITTALS

- A. Provide shop drawings and product data for the Work of Divisions 26 in accordance with Section 01 33 00. Refer to each Section for required shop drawings and product data submittals.
- B. Acceptable Submittal Formats: Hard-Copy, or Electronic. If Electronic format is selected, at least one Hard-Copy of the information must be submitted with the Electronic copies to the Engineer (the Hard-Copy will not be returned).
- C. Submittal material sent by facsimile machine will not be accepted.

- D. Post Contract Award:
1. Provide complete drawings, diagrams, illustrations, performance charts, brochures, and/or other data which adequately describes product to enable thorough evaluation.
 2. Number of copies, method of distribution, format and schedule for submission shall be per Supplementary Conditions or Division 1.
 3. Submit all at one time.
 4. Review and correct submittal information with stamped approval prior to forwarding to Architect.
 5. Do not order or manufacture equipment until full review received from Architect and/or Engineer.
 6. Submit, where applicable, certificates denoting conformance to standards adopted by recognized organizations such as NEMA, UL, OSHA, etc.
 7. Schedule of values.
 8. Submittal formats shall conform with the following requirements:
 - a. Each hard-copy Submittal package shall be formatted as follows:
 - 1) Use three-ring loose leaf binders.
 - 2) Provide index referencing specification section and page.
 - 3) Tab individual sections.
 - b. Each Electronic Submittal package shall be formatted as follows:
 - 1) The full extent of the submitted data shall be presented in a single electronic file on a CD-ROM.
 - 2) File Format Type: Adobe pdf, or universally readable equivalent.
 - 3) Scanned information: Minimum 400 dpi.
 - 4) Provide index referencing specification section and page.
 - 5) Bookmark individual sections.
 - 6) One file per CD-ROM.
 - a) Format CD-ROM for use in PC compatible hardware
 - b) Format CD-ROM so that additional files may be written to it (read-write).
- E. Review statements and submittals prepared by the Contractor will be evaluated by the Engineer, and one of the following statements will be affixed to the submittal material.
1. "No Exception Taken" The meaning and intent of this statement is that the Engineer finds no objection (except those noted thereon or in correspondence) to inclusion of items or Work indicated in construction provided that it:
 - a. Complies with Contract Drawings and Specifications as to quantities, space requirements, and dimensions.
 - b. Does not interfere with other trades.
 - c. Is not the cause of union tradesmen disputes.
 - d. Does not infringe on patent rights.
 - e. Is not the cause of injury or damage to persons or property.
 - f. Complies with OSHA regulations.
 2. "Rejected" The meaning and intent of this statement is that the submitted material does not conform to plans and specifications. Resubmittal of a different product or shop drawing is required.
 3. "Revise and Resubmit" This statement is used when the general product line is acceptable, but the submitted material varies in dimension, accessories, etc. from what is required. Resubmittal is required.
 4. "Make Corrections Noted" This statement is used as an alternative to "Revise and Resubmit" when resubmittal is not required.
 5. Said review does not relieve Contractor of any Contractual responsibilities.

1.08 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.

1.09 OPERATION AND MAINTENANCE MANUALS, INSTRUCTION AND TRAINING

A. Manual:

- 1. Provide in accordance with Section 01 70 23. Scope: Following installation of electrical equipment, and prior to acceptance of Electrical Work, prepare manuals describing operations, servicing, and maintenance requirements of electrical equipment and systems installed.
- 2. Equipment described in manual:
 - a. Equipment listed under "Submittals."
 - b. Other auxiliary miscellaneous systems.
- 3. Information contained in manual:
 - a. Catalog data on each item including complete parts lists, catalog numbers, maintenance information and wiring diagrams.
 - b. Service organizations for equipment.
 - c. Manufacturer's recommended servicing instructions.
 - d. Diagrams complete for each system installed.
- 4. Presentation:
 - a. Provide information on neat, clean 8-1/2 inch x 11 inch sheets.
 - b. Provide drawings, accordion folded to letter size.
 - c. Divide manual into chapters which follow section sequence of Specifications of this Division.
- 5. Cover:
 - a. Enclose each manual in hardboard post-type binder.
 - b. Imprint front of binder with following:
 - 1) "Electrical Equipment."
 - 2) Name of Owner.
 - 3) Year completed.
 - 4) Names of Architect, Engineer and Contractor.
 - c. Imprint outside end cover of binder with following:
 - 1) "Electrical Equipment."
 - 2) Name of building.
 - 3) Name of Owner.
 - 4) Year of completion of building.

B. Instruction and Training:

- 1. Contractor responsibilities:
 - a. Train Owner personnel in operation and maintenance of all installed electrical equipment and systems.
 - b. Submit proposed scope of training materials and instruction schedule to Architect for review and approval 30 days prior to scheduled completion of building.
 - c. Arrange mutually agreeable dates for training with Owner.
 - d. Include classroom and on-the-job instruction by qualified installation and maintenance personnel.

1.10 RECORD DRAWINGS

- A. Provide in accordance with Section 01 78 39.

1.11 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.

1.12 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.

1.13 COORDINATION

- A. Provide coordination for the Work of this Division in accordance with Division 1 Sections 01 31 00 and 01 32 00.
- 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.

1.14 ALTERNATIVES AND ALLOWANCES

- A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

1.15 WARRANTY

- A. Warrant all Work included in this Specification for period of one year from date of substantial completion, under provisions of Section 01 77 00.
- 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.

1.16 SCHEDULE OF VALUES

- A. After award of contract, submit to Engineer a cost breakdown of work. Divide costs into the following categories:
 - 1. Administration.
 - 2. Basic materials and methods.
 - 3. Panelboards and switchgear.
 - 4. Luminaires.
 - 5. Lighting controls
 - 6. Fire alarm equipment.
 - 7. Telecommunications
 - 8. Other.
- B. Submit in accordance with provisions of this Section.

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 EXCAVATION

- A. Contact utilities before starting any excavation to locate underground services on site or in adjacent streets.
- B. Locate and protect any existing underground services.
- C. Repair any services damaged.

3.04 TRENCHING AND BACKFILLING

- A. See Section 31 23 33.
- B. As-built one-line drawing is required for all buried, encased, concealed wiring and conduit.
- C. Provide trenching and backfilling to depth required for underground conduit, per NEC and/or Utility requirements, 36 inches minimum.
- D. Backfilling prior to inspection of installation by and serving Utility not permitted.
- E. Minimum backfill requirements:
 - 1. Raceway runs beneath building slabs, beneath areas to be paved and beneath streets and sidewalks.
 - a. Use 1/4 inch to 1 inch diameter, crushed or clean round river rock.
 - 2. Underground raceway runs at all other locations.
 - a. Backfill in compacted layers not exceeding 6 inches in depth.
 - b. Use sand or "clean" earth free from rock larger than 1 inch diameter and debris.

3. Provide one continuous #14 copper conductor as a tracing conductor for locating the conduits in the future. Install the tracing conductor at the center line of the upper-most conduit in the trench. Install one tracing conductor in each conduit trench for each 4-foot trench width and one for each additional trench width of less than 4 feet wide. (i.e., provide one for a trench up to 4-feet wide, two for 5-8 feet wide, three for 9-12 feet wide, etc.). Provide a 6 foot coil of tracing wire at each end of the trench clearly marked on an identification tag: "TRENCH TRACING CONDUCTOR". Also include the tracing conductor destination and a description of the conduits/conductors in the trench. The identification tag shall be machine generated text, enclosed in a waterproof clear plastic seal, and attached to the coil by means of a tywrap.
- F. Trenching and Backfilling for Services:
 1. Coordinate with all utilities for joint trench service Work.
 2. Uncover existing utilities by hand digging only.
 3. Size to accommodate all utility service conduits and accessories.
 - G. Power digging only in direction away from existing facilities.
 - H. Route trenching in manner to avoid weakening footings.
 - I. Restore, to Architect's satisfaction at no additional expense, any sidewalks, landscaping, or other existing structure damaged due to excavation.
- 3.05 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.
- 3.06 CUTTING AND PATCHING
- A. See Sections 01 73 00.
 - 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.
- 3.07 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.
- 3.08 MANUFACTURER'S INSTALLATION DETAILS
- A. Follow exactly, where available.
 - B. Provide special wiring or fittings as required.
- 3.09 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.

3.10 COORDINATION

- A. Coordinate all distribution equipment, luminaires, device locations, conduit and cabletray routing, etc. 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.

3.11 TESTS

- A. Fully test and adjust equipment installed under these 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.
- C. Demonstrate functions and location of each system and indicate its relationship to "Riser-Diagrams" on Drawings. Demonstrate by "Start-Stop operation" how to work controls, reset protective devices, replace fuses and procedures for emergency conditions.
- D. Submit to Engineer certificate of completed demonstration countersigned by Architect.

3.12 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.

3.13 EXTRA STOCK

- A. Provide extra stock, as described in individual sections, to Owner in accordance with Division 1.

3.14 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.

- B. Conduit, wire and circuit breaker sizes for mechanical and similar equipment are based on the equipment ratings of one manufacturer. The equipment actually furnished may have entirely different electrical characteristics. Conduit, wire and circuit breakers shall not be ordered or installed until exact electrical requirements are obtained. Responsibility for this coordination rests with the Contractor.

END OF SECTION

SECTION 26 01 60

MINOR ELECTRICAL DEMOLITION FOR REMODELING

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. Disconnect electrical installations in walls, floors, and ceilings scheduled for removal. Report discrepancies to Architect before disturbing existing installation.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities. Report discrepancies to Architect before disturbing existing installation.
- C. 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 qualified for 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 abandoned panelboards and distribution equipment.
 - 1. Remove interior bussing of existing panel where panel enclosure is being reused as a junction box.

- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
 - G. Disconnect and remove abandoned luminaires.
 - 1. Remove brackets, stems, hangers, and other accessories.
 - H. Repair adjacent construction and finishes damaged during demolition and extension work.
 - I. Maintain access to existing electrical installations which remain active.
 - 1. Modify installation or provide access panel as appropriate.
 - J. Extend existing installations using materials and methods compatible with existing electrical installations.
 - K. Check branch circuit wiring disturbed in execution of this Work which is to remain for continuity, overloads and grounds. Repair any deficiencies.
 - L. 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.
 - M. Relocate and reuse existing luminaires as shown on drawings. Repair or replace missing or faulty parts such as reflectors, lens, and ballasts for first class operating condition. Provide new lamps.
 - N. All salvage materials shall remain property of Owner and shall be stored at location designated by Owner, unless otherwise noted by Architect.
 - O. 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.
- 3.04 DISPOSAL OF PCB BALLASTS CONTAINING PCB'S
- A. Ballasts in removed fixtures not labeled "No PCBs" shall be assumed to contain PCBs.
 - B. Remove PCB ballasts from fixtures and properly dispose of by incineration.
 - 1. Employ an abatement contractor with five years documented experience in ballast disposal.
 - C. Submit to Architect: Certification of Ownership transferal including Bills of Lading, Bills of Storage, and Bills of Incineration.
- 3.05 DISPOSAL OF FLUORESCENT LAMPS CONTAINING MERCURY
- A. Lamps in removed fixtures shall be assumed to contain mercury.
 - B. Remove lamps from fixtures and properly dispose of by mercury reclamation process.
 - 1. Employ an abatement contractor with five years documented experience in lamp disposal.
 - 2. Submit to Architect: Certification of Ownership transferal including Bills of Lading, Bills of Storage, and Bills of Reclamation.

END OF SECTION

SECTION 26 05 19

WIRE AND CABLE

Part 1 - General

1.01 SECTION INCLUDES

- A. Building wire.
- B. Cable.
- C. 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. American Insulated Wire Corp.
- B. General Cable.
- C. Southwire.
- D. Cerrowire.
- E. United Copper Industries.
- F. Substitutions: Under provisions of Section 26 01 00.

2.02 BUILDING WIRE

- A. Feeders and Branch Circuits Larger than 2 AWG:
 - 1. Copper.
 - 2. Stranded conductor.
 - 3. 600 volt insulation.
 - 4. THHN, XHHW, except where adverse conditions require other insulation types.
- B. Feeders and Branch Circuits 4 AWG and Smaller:
 - 1. Copper conductor.
 - 2. 600 volt insulation.
 - 3. THHN/THWN.
 - 4. Not less than 98% conductivity.
 - 5. Stranded conductors only.
- C. Control Circuits:
 - 1. Copper.
 - 2. Stranded conductor
 - 3. 600 volt insulation.
 - 4. THHN/THWN.
- D. Color Coding: (Obtain state and local electrical inspector's approval).
 - 1. 120/208 Volt System:
 - a. A phase - black.

- b. B phase - red.
- c. C phase - blue.
- d. Neutral - white striped with black, red, or blue per phase
- e. Travelers - purple.
- f. Switch leg - pink.
- g. Ground - green.

2.03 REMOTE CONTROL AND SIGNAL CABLE

- A. Control Cable for Class 1, 2, or 3 Remote Control and Signal Circuits:
 - 1. Copper conductor.
 - 2. 600 volt insulation.
 - 3. Rated 60° C.
 - 4. Individual conductors twisted together.
 - 5. Shielded or non-shielded as required by equipment manufacturer.
 - 6. Covered with a PVC jacket.
 - 7. Class 2 or 3 cables used in plenums shall be UL listed for such use.
 - 8. Shall conform to the recommendations of the communication and signal systems manufacturer.
 - 9. Provide wiring as required for the systems being furnished.

Part 3 - Execution

3.01 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. Torque logs are required at each service and/or distribution location to ensure good connections.
- C. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet, and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.
- D. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
- E. No shared neutrals. Provide one neutral for each phase conductor in branch circuits.
- F. Wire and cable shall be brought to the job in the original containers bearing the U.L. label.
- G. Splice only in junction or outlet boxes.
- H. Neatly train and lace wiring inside boxes, equipment, and panelboards using cable ties.
 - 1. Manufacturer: T&B Ty-Rap, or approved.
- I. Wire pulling lubricant may not be Ideal 77 yellow.

3.02 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time.
- B. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.
- C. 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.
- D. Equipment Grounding Conductors:
 - 1. Provide a separate, insulated equipment grounding conductor in feeder and all 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.

- E. Wires shall be pulled in such a manner as to avoid kinking or abrasion to the insulation. Use only approved lubricants. Oil or grease shall not be used to lubricate wires.
- F. Make sure that couplings and conduit connectors have pre-insulated bushings in place before pulling wires.
- G. Wire insulation color shall be the same from one end to another, inclusive.
- H. Completely and thoroughly swab raceway system before installing conductors.

3.03 CABLE INSTALLATION

- A. Provide protection for exposed cables where subject to damage.
- B. Support cables 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.

3.04 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.
 4. Molded connectors with metal thread-on core shall be used for splicing #14, #12 and #10 wire.
 5. Molded connector manufacturer: 3M or Buchanan.
- C. #6 Copper Wire and Larger:
 1. Use pressure lug terminals and splicing connectors or compression lug terminals and connectors rated for the material of the terminals and conductor and properly installed.
 2. Manufacturer: Burndy, IlSCO, OZ/Gedney, or approved.
 3. Cover uninsulated conductors and connectors with an insulating device suitable for the purpose and 150 percent of the insulation value of conductors.
- D. Thoroughly clean wires before installing lugs and connectors.
- E. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.
- F. Terminate spare conductors with electrical tape.

3.05 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.

3.06 WIRE AND CABLE INSTALLATION SCHEDULE

- A. Interior and Exterior 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, at a minimum, three number 12 conductors for all branch circuits.
- C. Unless otherwise noted on drawings provide one (1) number 12 conductor for each branch circuit for grounding.
- D. Conductor sizes indicated, such as home run, annotations, shall be maintained throughout entire circuit length.
- E. Clock Wiring: 1/2"C 4/C #20 cable.
- F. Fire Alarm Wiring: 3/4"C.
- G. Fire Alarm and BMS low-voltage can share voice/data j-hooks or cable trays if fully coordinated and Owner approved.

END OF SECTION

SECTION 26 05 29
SUPPORTING DEVICES

Part 1 - General

1.01 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Fastening hardware.

1.02 RELATED SECTIONS

- A. Section 03 00 00 - Concrete

1.03 COORDINATION

- A. Coordinate size, shape, and location of concrete pads with Division 3.

1.04 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.
 - 8. Do not drill structural steel members.
 - 9. Drive anchors, nails, wires, and perforated tape are prohibited for supports.
- B. Equipment Support Partitions:
 - 1. Toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls.
 - 2. Expansion anchors or preset inserts in solid masonry walls.
 - 3. Self-drilling anchors or expansion anchor on concrete surfaces.
 - 4. Sheet metal screws in sheet metal studs.
 - 5. Wood screws or sheet metal screws in wood construction.
- C. In wet locations install free-standing electrical equipment on concrete pads.

- D. Cabinets and Panelboards:
 - 1. Minimum of four anchors.
 - 2. Provide steel channel supports to stand cabinet one inch (25 mm) off wall.
 - 3. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

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 event at the site. Seismic Restraint Type: In accordance with Section 26 05 48.
 - 2. Anchorage for equipment subject to thermal expansion shall be in accordance with recommendations of the manufacturer.
 - 3. Anchors and fasteners shall be sized to resist shear and overturning moments caused by the anticipated seismic forces.

END OF SECTION

SECTION 26 05 30

CONDUIT

Part 1 - General

1.01 SECTION INCLUDES

- A. Rigid metal conduit and fittings.
- B. Electrical metallic tubing and fittings.
- C. Flexible metal conduit and fittings.
- D. Liquidtight flexible metal conduit and fittings.
- E. Non-metallic conduit and fittings.

1.02 RELATED SECTIONS

- A. Section 26 01 55 - Electrical Systems Fire Stopping
- B. Section 26 05 29 - Supporting Devices
- C. Section 26 05 48 - Seismic Restraints
- D. Section 26 05 53 - Electrical Identification

1.03 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 RIGID STEEL CONDUIT

- A. Standard pipe with screwed joints for electrical raceway use.
- B. Zinc coated by hot dip galvanizing or sherardizing.
- C. Manufacturer: Allied Tube and Conduit, Triangle PWC Inc., Western Tube & Conduit, or approved.

2.02 ELECTRIC METALLIC TUBING (EMT)

- A. Zinc coated by hot dip galvanizing or sherardizing.
- B. Manufacturer: Allied Tube and Conduit, Triangle PWC Inc., or approved.

2.03 FLEXIBLE CONDUIT

- A. Galvanized steel or aluminum, abrasion resistant.
- B. Manufacturer: Anamet (Type DE-710), Triangle PWC, Inc. (Type 710), or approved.

2.04 FLEXIBLE CONDUIT, LIQUID TIGHT

- A. Hot dipped galvanized steel core with thermoplastic overcoat.

- B. Manufacturer: AFC Nortek, Alfex, Anamet (Type "UA"), Electriflex, Thomas & Betts, or approved.

2.05 CONNECTIONS AND FITTINGS

- A. Especially for purpose used.
- B. Same material and finish as raceway.
- C. Conduit bodies are not allowed in utility tunnels and electrical vaults.

2.06 UNION JOINTS FOR RIGID STEEL OR IMC CONDUIT

- A. Split coupling.
- B. Running threads not allowed.
- C. Insulated throat.
- D. Manufacturer: O.Z. Gedney type "SSP," or approved.

2.07 COUPLINGS AND CONNECTORS FOR ELECTRICAL METALLIC TUBING (EMT)

- A. Exterior/Interior: Raintight compression type, employing split corrugated ring and tightening nut.
- B. Connectors larger than 1¼-inch shall be Thomas & Betts 200 Series insulating bushing.
- C. Manufacturer: Appleton, Raco, Thomas & Betts, or approved.
- D. Cast connectors and couplings are not allowed.

2.08 CONDUIT HANGERS AND SUPPORTS

- A. One- or two-hole pipe straps. Acceptable manufacturers: Kindorf, or approved.
- B. One or two-hole push-on strap manufactures: Appleton, Raco, Thomas & Betts, or approved.
- C. Lay-in pipe adjustable hangers. Acceptable manufacturers: Kindorf, Steel City, Pline, or approved.
- D. Trapeze or wall surface supports shall be Kindorf "bolt-hole" base, galvanized steel channels with C105 and C106 single bolt pipe straps.
- E. Galvanized steel channels and associated support rods shall be selected to accommodate weight of associated raceway and wire.
- F. Use of J-nails is not permitted.
- G. Fastener designed for the purpose may be used in wood or metal stud construction or for support channels, or beams.
 - 1. Manufacturer: Caddy, B-Line, or approved.
- H. Conduits are not permitted to be supported from ductwork, pipes, ceilings, ceiling support wires or other systems foreign to electrical installation.
- I. 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 GENERAL REQUIREMENTS

- A. Owner review and approval is required for any conduit buried in slab on grade applications.]

- B. Owner's FS Electrician(s) is to walk through the project to view pathways prior to encasement or enclosure.]
- C. MC cable not allowed unless otherwise noted.

3.02 CONDUIT SIZING AND ARRANGEMENT

- A. Size conduit for Type THW conductors. Minimum conduit size for home runs and backbone conduit system is 3/4 inch. Individual branch circuits from backbone junction boxes 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. Provide conduit for building monitoring cables where called for on drawings.
- G. Individual station outlets will be served by at least a 3/4" conduit run from the nearby cable tray to station location that will be equipped with 4" deep square box with single mud ring.
- H. All branch circuits shall be run in metallic conduit or tubing.
- I. In equipment rooms, run conduit on wall surfaces in a neat fashion as high on the wall as possible.

3.03 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.
- N. All surface run conduit to be secured with one- or two-hole straps.

3.04 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. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Install no more than the equivalent of four 90 degree bends between boxes, for electrical wiring.
- E. Use conduit bodies to make sharp changes in direction, as around beams, for electrical wiring.
- F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-1/4 inch size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Avoid condensation between moist warm locations and cool locations by blocking air flow in conduit with "Duct Seal" or similar material.
- I. Thoroughly clean interior of conduits.
- J. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- K. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- L. Install expansion joints where conduit crosses building expansion or seismic joints.
- M. Communication Conduits shall NOT have more than 180 degrees of bend or 100 feet between pull points.
- N. Pull points shall be appropriately sized junction boxes.
- O. Use of metallic conduit is not sufficient for purposes of equipment safety grounding. All circuits regardless of the type of conduit shall be provided with a safety and equipment ground conductor.
- P. Do not run conduit where it is not required for limited energy wiring.
- Q. Minimum Inside Bend Radius for Communications Conduit Bends, Sweeps, Boxes, and Fittings:
 1. Underground or Underslab 4-inch (100 mm) Conduit: 60 inches (1.5 m)
 2. Other Conduit Runs:
 - a. One-inch (25 mm) conduit, 11 inches (275 mm).
 - b. Two-inch (50 mm) conduit, 21 inches (525 mm).
 - c. Three-inch (75 mm) conduit, 31 inches (775 mm).

- d. Four-inch (100 mm) conduit, 40 inches (1000 mm).
 - e. Other sizes, 10 times the inside diameter of the conduit.
- R. Do not install boxes, bends, elbows, tees, conduit bodies, and other conduit fittings, which do not provide for the minimum inside cable bend radius specified in paragraph Q above.
- 1. Conduit Bodies: in-line straight-through Type C conduit fittings can be used as pull boxes for conduit up to a maximum of 2 inches (50 mm) ID. Other conduit fittings, which include direction changes such as E, L, LB, LR, LL, LRT, TA, TB, and X, are not allowed.
- S. Provide each conduit passing from a nonhazardous or noncorrosive area to a hazardous area and each conduit entering an enclosure within a hazardous area with a sealing fitting in accordance with NEC Article 500. The sealing fittings to be UL listed and to be filled with approved sealing compound of the same manufacture,

3.05 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.
- C. Route conduit through roof openings for piping and ductwork where possible: otherwise, route through roof jack with pitch pocket.

3.06 CONDUIT INSTALLED IN FLOOR SLABS

- A. Conduit shall be schedule 40 PVC, rigid steel, IMC or EMT. EMT shall not be installed in concrete slabs that are in contact with soil, gravel or vapor barriers.
- B. Conduit shall be run in direct lines.
- C. Conduit shall not be installed through concrete beams, except:
 - 1. Where shown on the structural drawings.
 - 2. As approved by the Architect prior to construction, and after submittal of drawing showing locations, size, and position of each penetrations.
- D. Conduit shall not be installed in concrete which is less than three inches thick.
 - 1. Conduit outside diameter larger than 1/3 of the slab thickness is not permitted.
 - 2. Spacing between conduits in slab shall be approximately six conduit diameters apart except one conduit diameter at conduit crossings.
 - 3. Conduits shall be installed approximately at the center of the slab so that there will be a minimum of 3/4-inch of concrete around them.
- E. Compression couplings and connections shall be watertight. Thread compounds shall be UL listed conductive type to insure low resistance ground continuity throughout the conduit. Set screws shall be tightened with socket driver.

3.07 FLEXIBLE CONDUIT

- A. Use limited to the following:
 - 1. Lighting fixture pigtails 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. In stud walls in lengths not exceeding 8'-0". Secured to prevent rattling.
 - 7. Flexible conduit may be fished in stud walls.
- B. Provide separate ground conductor full length of flexible conduit or outside of conduit.

3.08 FLEXIBLE CONDUIT, LIQUID TIGHT

- A. Exterior motor connections for movable or vibrating equipment.
- B. Flexible connections in damp or wet locations.
- C. Provide separate ground conductor full length of flexible conduit in addition to integral bonding tape.

3.09 RIGID STEEL CONDUIT

- A. Exposed indoor runs where subject to damage up to 8 feet above finished floor.
- B. In poured concrete or masonry.
- C. Exposed outdoor locations.
- D. For utility tunnels and electrical vaults, no direct mounting to cement or concrete.

3.10 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.
- D. In poured concrete, masonry walls or above grade slabs.
- E. May not be used in or under concrete slab or underground.

END OF SECTION

SECTION 26 05 32

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. Access Doors: Wall and ceiling access doors.
- B. Section 26 27 26 - Wiring Devices.

1.03 REFERENCES

- A. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
- B. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- C. UL514A - Metallic outlet boxes.

1.04 PROJECT CONDITIONS

- A. Verify field measurements are as shown on drawings.

1.05 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. Appleton.
- B. Crouse Hinds.
- C. Killark.
- D. O Z Gedney.
- E. Raco/Bell.
- F. Steel City.
- G. Thepitt.
- H. Substitutions: under provisions in Section 26 01 00.

2.02 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: Galvanized steel.

- B. Cast Boxes: Aluminum or cast ferrous, 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 with Architect prior to rough-in.
- C. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of required access doors with applicable section.
- D. Minor changes in the location of outlets from those shown on the plans shall be made without extra charge if so directed by the Project Manager before installation.

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 is 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.
- M. Provide cast outlet boxes in exterior locations when exposed to the weather and wet locations.
- N. In areas where outlets are subject to damage or abuse, provide backing behind box. Support both sides of boxes on backing.
- O. New outlet boxes shall be surface mounted unless specifically noted otherwise.
- P. Unused openings in outlet boxes must be left sealed or closed with plugs.
- Q. Outlet boxes are to be sealed at exterior walls and as needed in other locations.
- R. Provide keyed or secured box for outlets at exterior and loading docks for Contractor and Facilities use.

3.03 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas unless otherwise noted.
- B. Support pull and junction boxes independent of conduit.
- C. Boxes larger than 200 cubic inches or 18 inches in any dimension:
 - 1. Use hinged enclosure.
- D. Boxes are to be cleaned inside and out upon completion and prior to acceptance of work

END OF SECTION

SECTION 26 05 53

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 24 16 - Panelboards
- B. Section 26 27 26 - Wiring Devices.
- C. Section 26 28 13 - Disconnect Switches
- D. Section 28 31 75 - Fire Alarm and Smoke Detection Addressable Systems

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.

Part 3 - Execution

3.01 GENERAL

- A. During finish construction, labeling is to be reviewed and approved by the Owner.
- B. Zoned systems must be clearly defined and labeled.
- C. Label at all entries into new spaces and/or through walls.
- D. Covering or painting of any sign/label requires replacement.
- E. UO - Mark and label new wiring and place in tray. Include installation date.

3.02 NAMEPLATE 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. Where switches control remote lighting or power outlets, or where switches in the same outlet (two or more) serve different purposes such as lights, power, intercom, etc., or different areas such as corridor and outside, furnish either engraved nameplates or adhesive film labels with 1/8" black letters indicating function of each switch or outlet.
- E. Use adhesive film labels for identification of individual wall switch and receptacle cover plates.

3.03 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboards gutters, pull boxes, and at load connection.
- B. Identify with branch circuit or feeder number for power and lighting circuits.
- C. Tag lighting feeds with circuit number and panel ID.
- D. Identify control wire number as indicated on equipment manufacturer's shop drawings.

3.04 NAMEPLATE ENGRAVING SCHEDULE

- A. Identify all electrical distribution and control equipment and disconnect switches at loads served.
- B. 1/4-inch nameplates are to be fastened with sheet metal screws.
- C. Disconnect switches and control units shall include circuit number and panel ID.
- D. 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.

3.05 PULL BOX AND JUNCTION BOX IDENTIFICATION

- A. Provide permanent signage, interior and exterior, at all utility boxes, vaults, manholes, etc.
- B. Install labels on inside of junction boxes and adhesive film label on the box cover.
- C. Identify each junction box with complete system description. Examples:
 - 1. Fire alarm.
 - 2. Telephone.
 - 3. 480 V system.
 - 4. 208 V system.
 - 5. Fan controls.
- D. Methods:
 - 1. Neat hand lettering with permanent black marker.
 - 2. Engraved nameplates.
 - 3. Adhesive film labels.
- E. Fire alarm junction boxes:
 - 1. Paint fire alarm junction boxes and covers red and label "FIRE ALARM" prior to installation.
- F. 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.

3.06 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.
2. Where outlet use and branch circuit identification both are required, locate use such as "X-Ray" on top center and branch circuit identification at bottom center device plate.

END OF SECTION

SECTION 26 09 23

LIGHTING CONTROL EQUIPMENT

Part 1 - General

1.01 SECTION INCLUDES

- A. Occupancy Sensors.

1.02 REFERENCES

- A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- B. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 26 01 00.
- B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, and poles.
- C. Submit manufacturers' instructions under provisions of Section 26 01 00.

Part 2 - Products

2.01 OCCUPANCY SENSORS

- A. Approved manufacturers:
 - 1. Wattstopper.
 - 2. Approved substitution.
- B. Compatible with electronic loads.
- C. No minimum load requirement.
- D. Ceiling mount Dual Technology (passive infrared/ultrasonic)
 - 1. 360 degree sensing
 - 2. 1000 square foot coverage
 - 3. Adjustable sensitivity and time delay
 - 4. Additional single pole, double throw isolated relay outputs
- E. Power Packs:
 - 1. Input voltage: 120/230/277VAC, 50/60Hz
 - 2. Secondary voltage: 24VDC
 - 3. Secondary output: 225mA
 - 4. Field selectable auto-on or manual-on control
 - 5. Model: BZ-150

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.
- F. All occupancy sensors shall be wired with a low voltage switch and programmed to allow an automatic off - manual on (vacancy) operation.

3.02 SCHEDULES

A. Occupancy Sensors:

Type	Model	Technology	Mounting	Power Pack
A	DT-300	360° Passive Infrared/ Ultrasonic	Ceiling	Yes

END OF SECTION

SECTION 26 24 16

PANELBOARDS

Part 1 - General

1.01 SECTION INCLUDES

- A. Lighting and appliance branch circuit panelboards.

1.02 RELATED SECTIONS

- A. Section 26 05 48 - Seismic Restraints.
- B. Section 26 05 53 - Electrical Identification.

1.03 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Section 26 01 00.
- 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 and fusible switch arrangement and sizes.

1.04 SPARE PARTS

- A. Keys: Furnish one each per panelboard to Owner.
 - 1. Cat 70 or NSR 251.

Part 2 - Products

2.01 MANUFACTURERS

- A. Cutler-Hammer/Eaton.
- B. General Electric.
- C. ITE/Siemens.
- D. Square D.
- E. Substitutions: Under provisions of Section 26 01 00.

2.02 LIGHTING AND APPLIANCE PANELBOARDS

- A. Enclosure:
 - 1. Indoor: Type 1, unless otherwise noted.
 - 2. Outdoor: Type 3R.
 - 3. Cabinet size: 6 inches deep, 20 inches wide unless otherwise noted.
 - 4. Provide cabinet with concealed trim clamps, concealed hinge and flush lock all keyed alike.
 - 5. Finish in manufacturer's standard gray enamel.
 - 6. UO - Door-in-door construction.
 - a. Hinged Outer trim:
 - 1) Flush mount: Screw cover with 3/4" cabinet overlap.
 - 2) Surface mount: Match cabinet dimensions.
 - b. Circuit breaker door:

- 1) Concealed hinge.
- 2) Flush locking latch, all keyed the same.
- c. Dead front door:
 - 1) Hinged with outer trim and secured with screws at latch side.

B. Bussing:

1. Copper bus, ratings as indicated on Drawings.
2. Provide copper ground bus in all panelboards.
3. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 240 volt panelboards; 14,000 amperes rms symmetrical for 480 volt panelboards.
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. Series Rated.

2.03 SERVICE ENTRANCE EQUIPMENT

- A. Provide factory installed service entrance-type UL label for service entrance panelboard.
- B. Include connector for bonding and grounding neutral conductor.

Part 3 - Execution

3.01 INSTALLATION

- A. Install panelboards plumb, in conformance with NEMA PD 1.1.
- B. Height: 6 ft. 6 inches to center of the grip of the operating handle of the highest switch or breaker.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- E. Stub 2 empty 3/4 inch conduits to accessible location above ceiling or below floor out of each panelboard.

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. Take care to maintain proper phasing for multi-wire branch circuits. Provide written verification to Engineer.
- 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

SECTION 26 27 26

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.

2.02 RECEPTACLES

- A. GFCI Receptacles: Meets UL 943 (4th edition):
 - 1. Specification Grade: Heavy duty.
 - a. 125 volt, 20 amp, Hubbell GF20AL, Leviton 7899.
- B. Special Outlets not Specified herein:
 - 1. As scheduled.
 - 2. Comparable quality finish and duty to those specified above.
 - 3. Of ample capacity to accommodate load.
 - 4. Manufacturers: Same as for receptacles above.

2.03 DEVICE COLOR

- A. White.

2.04 ACCEPTABLE MANUFACTURERS' WALL PLATES

- A. Hubbell.
- B. Leviton.
- C. Substitution: under provisions of Section 26 01 00.

2.05 WALL PLATES

- A. Decorative Cover Plate:
 - 1. Smooth stainless steel, 302/304 alloy with brushed finish.
 - 2. No plastic wall plates.

2.06 ACCEPTABLE MANUFACTURERS - WEATHERPROOF COVER PLATES

- A. Crouse Hinds
- B. Hubbell/Raco/Bell
- C. Substitutions: under provisions of Section 26 01 00.

2.07 WEATHERPROOF COVER PLATES

- A. Gasketed cast metal.
- B. Gasketed device covers.
- C. Corrosion resistant.
- D. Meets NEC 406.8 Receptacles in damp or wet locations.

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 to top of box, 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. Install specific-use receptacles at heights shown on Contract Drawings.
 - 7. Provide 20 amp rated receptacles where the device is served by a dedicated circuit.
- C. Plates:
 - 1. Decorative plates on switch, receptacle, and blank outlets in finished areas.
 - 2. Jumbo size plates for outlets installed in masonry walls.
 - 3. Galvanized steel plates on outlet boxes and junction boxes in unfinished area, above accessible ceilings, and on surface-mounted outlets.
 - 4. Install device and wall plates flush and level.
 - 5. 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.

END OF SECTION

SECTION 26 28 13

DISCONNECT SWITCHES

Part 1 - General

1.01 SECTION INCLUDES

- A. Disconnect switches.
- B. Enclosures.

1.02 REFERENCES

- A. FS W-F-865 - Switch, Box, (Enclosed), Surface-Mounted.
- B. NEMA KS 1 - Enclosed Switches.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 26 01 00.
- B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

Part 2 - Products

2.01 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

- A. Eaton/Cutler-Hammer.
- B. General Electric.
- C. Siemens/ITE.
- D. Square D.
- E. Substitutions: Under provisions of Section 26 01 00.

2.02 DISCONNECT SWITCHES

- A. Nonfusible Switch Assemblies:
 - 1. Quick-make, quick-break, load interrupter enclosed knife switch.
 - 2. Externally operable handle.
 - 3. Interlocked to prevent opening front cover with switch in ON position.
 - 4. Handle lockable in OFF position.
- B. Enclosures:
 - 1. Indoor: NEMA Type 1 unless otherwise indicated on Drawings.
 - 2. Outdoor: NEMA Type 3R.
- C. Single Phase Motors, 125 Volt, 1/8 Horsepower and Larger:
 - 1. Where thermal overloads are provided: 125 volt, SPST toggle type switch.
 - 2. Where thermal overloads not provided: 125 volt, SPST toggle type switch with thermal overload heaters.
 - 3. Exterior disconnects in NEMA 3R enclosures.

Part 3 - Execution

3.01 INSTALLATION

- A. Install disconnect switches where indicated on Drawings.
- B. Install fuses in fusible disconnect switches.
- C. Provide fuses sized in accordance with NEC and equipment manufacturer's name plate ratings.
- D. Locate as close to equipment controlled as possible, within sight of equipment, unless otherwise noted.
- E. Maintain code clearances.
- F. Label switch to indicate equipment served and to indicate power source.
 - 1. Engrave label and install as described in Section 26 05 53 - ELECTRICAL IDENTIFICATION.

3.02 FUSIBLE DISCONNECTS REQUIRED

- A. Where specifically noted on drawings.
- B. Where fuses are recommended by equipment manufacturer.
- C. Where multiple motors requiring separate disconnect switches are fed from a common branch circuit.
- D. Furnish all code required disconnects under this work, whether specifically shown or not.

END OF SECTION

SECTION 26 50 00
LIGHTING FIXTURES

Part 1 - General

1.01 WORK INCLUDED

- A. Provide a typical lighting fixture, complete with lamps and ballasts, at each lighting outlet shown.

1.02 SECTION INCLUDES

- A. Interior luminaires and accessories.
- B. Lamps.
- C. Ballasts.

1.03 RELATED SECTIONS

- A. Section 09 09 00 - Painting.
- B. Section 26 27 26- Wiring Devices.
- C. Section 26 09 23 - Lighting Control Equipment.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 26 01 00.
- B. Include outline drawings, lamp and ballast data, support points, weights, and accessory information for each luminaire type.
- C. Pole data and pole base details.
- D. Submit manufacturer's installation instructions under provisions of Section 26 01 00.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 26 01 00.
- B. Store and protect products under provisions of Section 26 01 00.

1.06 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 fire rating of new and existing ceilings.

Part 2 - Products

2.01 INTERIOR LUMINAIRES AND ACCESSORIES

- A. See Luminaire Schedule.
- B. Recessed Fluorescent Luminaires:
 - 1. Provide trim type and accessories required for installation in ceiling system installed.

- C. Stems for Pendant Mounting:
 1. Rigid steel conduit, length as required for mounting height.
 2. 45 degree ball aligner and canopy.
 3. Finishes and Manufacturer: Same as for lighting fixture, unless otherwise noted.
- D. Lighting Fixtures Recessed in Fire Rated Ceilings:
 1. Reference Division 9 and for fire rated ceiling materials included in project.
 2. Provide fixture label indicating fixture is listed by UL for installation in the fire rated assembly.
 3. Provide an approved fire rated enclosure around fixture to maintain a rated ceiling system.
- E. 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. Unless otherwise noted, prismatic lenses shall be A19, 0.156 inches minimum thickness virgin acrylic. Hogged out prisms are not acceptable.
 4. All fixture parts shall be painted after fabrication.

2.02 ACCEPTABLE MANUFACTURERS - LAMPS

- A. Osram/Sylvania.
- B. General Electric.
- C. Philips.
- D. Substitutions: Under provisions of Section 26 01 00.

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.
 6. Minimum initial lumens @ 25 degrees C - 3100 lumens.

2.04 BALLASTS (GENERAL)

- A. HPF, unless otherwise noted.
- B. Number of lamps controlled by ballast:
 1. HID: One, unless otherwise noted.
 2. Fluorescent: As required by fixture or by switching requirements.
- C. Date of manufacturer stamped on case.
- D. Mounted as integral part of lighting fixture, unless otherwise noted.
- E. Temperature ratings as follows:
 1. Minimum indoor starting: +50° F.
 2. Minimum outdoor starting: -20° F.
 3. Maximum case temperature: +90° C.
- F. Provide "in-line" fusing. Size per manufacturer's recommendation.
- G. Voltage: As required by branch circuit voltage and "Luminaire Schedule."
- H. Same manufacturer as LAMPS.

2.05 BALLASTS (FLUORESCENT NON-DIMMING TYPE)

- A. Type - Solid state electronic.
 - 1. Designed to operate T8.
 - 2. Program start.
 - 3. High frequency operation >40 MHZ.
 - 4. Less than 10% THD.
 - 5. Parallel lamp operation.

- B. Acceptable manufacturers (rapid start, <10% THD):
 - 1. Osram Sylvania.
 - 2. Advance.
 - 3. General Electric.
 - 4. Philips.
 - 5. Substitutions - See Section 26 01 00.

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. Install Fluorescent luminaires larger than 2x4 foot size independent of ceiling framing.
 - 6. Support all pendant fixtures and all other incandescent, fluorescent, and HID fixtures in excess of 50 lbs 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.
 - 7. Provide two #12 gauge steel wire seismic supports connected to structure for light fixtures less than 50 lbs. Seismic supports may be installed slack.
 - 8. 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.

- C. Install recessed luminaires to permit removal from below.
 - 1. Use plaster frames in plaster ceiling.
 - 2. Install grid clips in grid type ceiling systems.

3.02 RELAMPING

- A. Relamp luminaires which have failed lamps at completion of work.

3.03 ADJUSTING AND CLEANING

- A. Align luminaires and 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. See architectural reflected ceiling plans for exact location of ceiling mounted lighting fixtures.

2. See architectural elevations for exact location of wall mounted lighting fixtures.
 3. Coordinate lighting fixture location in mechanical spaces with mechanical equipment. Report adverse conditions to Architect.
 4. Lighting fixtures are generally located for symmetrical pattern and to suit structural conditions. Location changes shall be approved by Architect.
 5. Do not install any work until any discrepancies discovered have been resolved.
- B. Preparation of Surfaces:
1. Clean field painted lighting fixtures, poles, etc., prior to application of paint. See Division 9.
- 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.
- D. Aim adjustable fixtures in general as indicated on Drawings with final adjustments directed by Architect.
- 3.05 LUMINAIRE SCHEDULE
- A. As scheduled on drawings.
- 3.06 PRODUCT WARRANTY
- A. Manufacturers' Warranty:
1. Ballast manufacturer's warranty statements:
 - a. Include in O&M Manuals a manufacturer's warranty statement, that any failed ballast will be replaced in the fixture, for a period of five (5) years, at no cost to the owner, commencing at project completion. Replacement ballasts shall be on site within a 48 hour period.

END OF SECTION