PROJECT MANUAL FOR:

VISITOR LOCKER ROOM RENOVATION
AUTZEN - EAST GATE, BUILDING 220
UO Project No. CP13-07

UNIVERSITY OF OREGON
EUGENE, OREGON

15 March 2013

Robertson | Sherwood | Architects PC

PROJECT TITLE PAGE

PROJECT MANUAL FOR:

VISITOR LOCKER ROOM RENOVATION
AUTZEN STADIUM - EAST GATE, BUILDING 220
UO Project No. CP13-07
2775 Martin Luther King Jr. Boulevard
University of Oregon
Eugene, Oregon

OWNER:

OREGON STATE BOARD OF HIGHER EDUCATION
UNIVERSITY OF OREGON
Division of Facilities Services
1295 Franklin Boulevard
Eugene, Oregon 97403-1276
Tel (541) 346-5276
Facilities Project Manager: Bruce Budzik

Department of Athletics, Facility Manager: Bob Beals
Tel: (541) 346-5609

ARCHITECTS: PROJECT NO. 1227

ROBERTSON/SHERWOOD/ARCHITECTS pc
132 East Broadway - Suite 540
Eugene, Oregon 97401
Tel (541) 342-8077
Fax (541) 345-4302
Project Architect: Scott Stolarczyk, AIA, LEED AP

MECHANICAL & ELECTRICAL ENGINEERS:

SYSTEMS WEST ENGINEERS, INC
411 High Street
Eugene, Oregon 97401
Tel (541) 342-7210
Fax (541) 342-7220
Mechanical Engineer: Brian Jacoby, PE
Electrical Engineer: Jeff Graper, PE
Plumbing Engineer: Steven Savich, PE

DATE:

MARCH 15, 2013

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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 Autzen Stadium East Gate Building 220 until 2:00 PM, Pacific Time, Tuesday, April 2, 2013 for the Autzen Visitor Locker Room Renovation project located on the campus of the University of Oregon, in Eugene, Oregon ("Project"). The Project includes interior renovation of an existing building to house new locker room and support facilities.

A **mandatory pre-bid conference and examination** of the site and conditions will be conducted at 9:00 AM, Thursday, March 21, 2013. Bidders shall meet with Owner's Representative at the project site for that purpose. Attendance will be documented through a sign-in sheet prepared by the Owner's Representative. Prime bidders who arrive more than 5 minutes after start of time of the meeting (as stated in the solicitation and by the Owner's Representative's watch) or after the discussion portion of the meeting (whichever comes first) shall not be permitted to sign in and will not be permitted to submit a bid on the Project.

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

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

OREGON STATE BOARD OF HIGHER EDUCATION

By: Jamie Moffitt, Vice President for Finance and Administration

OREGON UNIVERSITY SYSTEM

STANDARD 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
BID FORM

OUS CAMPUS: **UNIVERSITY OF OREGON**

PROJECT: **VISITOR LOCKER ROOM RENOVATION**
AUTZEN – EAST GATE, BUILDING 220

BID CLOSING DATE: _____

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")

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

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

____a. An individual doing business under an assumed name registered under the laws of the State of _____; or

____b. A partnership registered under the laws of the State of _____; or

____c. A corporation organized under the laws of the State of _____; or

____d. A limited liability corporation/company organized under the laws of the State of_____;

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

_____ Dollars ($_____)

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

• Notice of Retainer Contract Opportunity
• Instructions to Bidders
• Supplemental Instructions to Bidders, if any
• OUS Retainer Contract General Conditions
• UO Supplemental Retainer Contract General Conditions
• Sample Retainer Contract Supplement
• Performance Bond and Payment Bond
• Plans and Specifications
• Prevailing Wage Rates
• Payroll and Certified Statement Form
(Found at http://egov.oregon.gov/BOLI/WHD/PWR/W_PWR_Forms.shtml)
• Any ADDENDA numbered ____ through____, inclusive (*fill in blanks).*

2. GIFT IN KIND (OPTIONAL): This project has requested that we provide an opportunity for bidders and their subcontractors (all tiers) to provide gifts in kind. Please indicated the dollar value that you wish to donate to the Autzen Visitor Locker Room Renovation on the bid form as noted below. This value will be deducted from the Base Bid resulting in your net Bid for the project. All materials and equipment are to be as per Drawings and Specifications.

   GIFT IN KIND DONATION _____($_____)
   (This dollar amount shall be deducted by the University from your Bid in line 1 above to result in your net bid. Do not deduct your in-kind donation amount from line 1 above.)

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

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. Contractor's Project Manager for this project is: _____,
    Office Phone: _____ Cell Phone: _____.

11. The Undersigned certifies that it has not discriminated against minority, women, or emerging small businesses in obtaining any subcontracts for this project.

12. 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.

13. 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.

TABLE OF SECTIONS

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 executed 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 be in the form required by OUS and as posted from time to time on the OUS website and 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 of 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 Owner agree 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.. Contractor shall submit annual MWESB Reports on June 30 of each year the Contract is active. Contracts - 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 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 Contractor 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 and fire 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 its 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 remains 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 acknowledges and agrees that Owner reserves the right to withhold payment to Contractor 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, with 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 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 Work 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 to 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 (and subject to the provisions of 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 approved 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 conducted at the Work site 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:*	$_____
* *If using multiple sureties*	Total Penal Sum of Bond:	$_____

We, _____as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto the State of Oregon, acting by and through the State Board of Higher Education, on behalf of the 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:*	$ _____
** If using multiple sureties*	Total Penal Sum of Bond:	$ _____

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

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

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

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

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

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

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

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

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

Dated this _____day of _____, 20__.

PRINCIPAL: _____

By _____
Signature

_____
Official Capacity

Attest: _____
Corporation Secretary

SURETY: _____
[Add signatures for each if using multiple bonds]

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

_____
Name

_____
Signature

_____
Address

_____
City State Zip

_____
Phone Fax

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: January 1, 2013

http://www.oregon.gov/boli/WHD/PWR/Pages/January_2013_Index.aspx

CapCon MWESB Project Contract Report

File Version 4.10.13

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 helps 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.

Oregon University System

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	

Oregon University System

CapCon MWESB Subcontractor Report

Name of MWESB General/ Subcontractor/ Supplier	State of Oregon MWESB Certification Number	Self-Identified or Other Certified	Initial Sub-Contract Value	Sub-Contract value billed within the fiscal year (July 1-June 30)	Final Sub-Contract Value	Minority-Owned	Women-Owned	Emerging Small Business

SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: UO Autzen Visitor Locker Room Renovation.

B. Owner's Name: University of Oregon.

C. The Project consists of a renovation in the existing Autzen East Gate Building 220 located at 2775 Martin Luther King Jr. Boulevard, Eugene, Oregon.

1.02 CONTRACT DESCRIPTION

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

1.03 CONTRACT TIME

A. Do not commence Work until after execution of the Agreement, receipt of Notice to Proceed from Owner, and Owner's approval of Contractor's certificates of insurance.

B. Perform Work to accommodate Owner's occupancy requirements:
   1. Estimated Date of Notice to Proceed: April 22, 2013.
   2. Estimated Contractor Access to Site: April 22, 2013.
   3. Achieve Substantial Completion by August 2, 2013.

C. Perform Work to achieve Final Completion of entire project by September 15, 2013.

1.04 PERMITS AND INSPECTIONS

A. Architect will make City building permit applications. Owner will pay all systems development, plan check, and permit fees directly to the City of Eugene.

B. Contractor is responsible to pick up approved permits from authorities having jurisdiction.

C. Contractor is responsible to arrange for and attend required permit inspections and provide evidence that all permit inspections have been made and approved in accordance with Section 01 70 00.

1.05 OWNER FURNISHED CONTRACTOR INSTALLED ITEMS

A. Owner will furnish the following for installation by Contractor:
   1. Door hardware specified in Section 08 71 00.
   2. Metal lockers to be salvaged from Autzen Stadium Locker Room.
   3. Soap dispensers.

1.06 OWNER OCCUPANCY

A. Owner intends to occupy adjacent portions of the existing building during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Coordinate Work activities with Owner's scheduled activities, quite periods and building shut down.

E. Schedule the Work to accommodate Owner occupancy.

1.07 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Arrange use of site and premises to allow:

1. Owner occupancy.
2. Work by Owner.
3. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:
1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Contractor Parking: As indicated on Drawings. Coordinate final location with Owner's Project Manager.

E. Contractor Staging Areas: As indicated on Drawings. Contractor to limit staging to areas within project area.

F. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the building is unoccupied.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

1.08 MATERIAL SAFETY DATA

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

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

B. Documentation of changes in Contract Sum and Contract Time.

1.02 RELATED REQUIREMENTS

A. Document B-7 - Agreement Form: Contract Sum, retainages, payment period.

B. Document B-8 - General Conditions : Additional requirements for progress payments, final payment, changes in the Work.

1.03 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

B. Forms filled out by hand will not be accepted.

C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.

D. Submit Schedule of Values in duplicate within 10 days after date of Owner-Contractor Agreement.

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

F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Each calendar month ending on the last day of the month or date approved by Owner.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Present required information on electronic media printout.

E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.

F. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

G. Execute certification by signature of authorized officer.

H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

J. Submit four copies of each Application for Payment.

K. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 30 00.
   3. Wage Certification: Submit Payroll and Certified Statement Form complying with ORS 279.354 covering Contractor and sub-contractors.
   4. Daily Reports: Submit copies of daily reports for the pay period. Reports to include date, number of employees, subcontractors and number of employees, and brief description of work performed.

L. Owner will not process incomplete payment applications or applications without attachments.

M. Record Document Monitoring: Architect and Owner's Project Manager will review status of record document preparation under provisions of Section 01 70 00.

N. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Submittals for review, information, and project closeout.

D. Number of copies of submittals.

E. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.

B. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 PROJECT COORDINATION

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Coordinate completion and clean up work of separate sections in preparation for Substantial Completion.

C. During construction, coordinate use of site and facilities through the Owner's Project Manager.

D. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owners' activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Owner's Project Manager will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner's Project Manager.
   2. Architect.
   3. Contractor's Project Manager and Superintendent.

C. Agenda:
   1. Distribution of Contract Documents.
   2. Submission of list of Subcontractors, schedule of values, and progress schedule.
   3. Designation of personnel representing the parties to Contract, Owner and Architect.
   4. Designation of personnel representing the parties to Contract, and Architect.
   5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   6. Review use of site and access issues.
   7. Scheduling.
   8. Owner's environmental health and safety procedures and documentation.
   9. Identification of long lead time items of Work.

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

3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum weekly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner's Project Manager, Architect, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review status of outstanding items from previous meetings
3. Review of Work progress.
4. report.
5. Review Schedule including work to be performed in next two week period.
6. Identification of problems that impede, or will impede, planned progress.
7. Review of submittals schedule and status of submittals.
8. Architect's Report.
9. Sub-Contractor Reports.
10. Owner's Report.
11. Change Items.
12. Requests for Information.
13. New Items.
14. Other business relating to Work.

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

3.03 SUBMITTAL SCHEDULE

A. Architect will furnish Contractor a list of submittals required by individual specification sections.

B. Coordinate schedule with Progress Schedule.

C. Maintain Submittal Log to track progress of each submittal.
1. Update log daily.
2. Provide copies to Architect and Owner's Project Manager at each Progress Meeting.

3.04 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product Data: Identify applicable products, models, options and other data.
2. Shop Drawings: Prepare by competent drafters.
3. Samples for Selection: Provide manufacturer's complete color and finish line for selection.
4. Samples for Verification: Provide specified color / finish samples.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - CLOSEOUT SUBMITTALS.

3.05 SUBMITTALS FOR INFORMATION

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

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

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

3.06 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Other types as indicated.

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

3.07 NUMBER OF COPIES OF SUBMITTALS

A. Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

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

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.08 SUBMITTAL PROCEDURES

A. Transmit each submittal with approved form.

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

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

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

E. Deliver submittals to Architect at business address.

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

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

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

I. Provide space for Contractor and Architect review stamps.

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

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

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

END OF SECTION

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 RELATED SECTIONS

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

1.03 REFERENCES

1.04 SUBMITTALS

A. Within 7 days after date of Agreement, submit preliminary schedule .

B. Submit updated schedule with each Application for Payment.

C. Submit the number of opaque reproductions that Contractor requires, plus three copies which will be retained by Architect and Owner.

D. Submit under transmittal letter form.

1.05 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 11 x 17 inches or width required.

C. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

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

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

D. Indicate delivery dates for owner-furnished products.

E. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

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

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 7 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Mock-ups.

C. Control of installation.

D. Tolerances.

E. Testing and inspection services.

F. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008.

B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2011c.

C. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

D. ASTM E329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2011.

E. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2009.

1.04 SUBMITTALS

A. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Conformance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.
   2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

B. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

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

1.05 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.06 TESTING AND INSPECTION AGENCIES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

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

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary telephone service.

D. Temporary sanitary facilities.

E. Temporary Controls: Barriers, enclosures, and fencing.

F. Protection.

G. Security requirements.

H. Vehicular access and parking.

I. Waste removal facilities and services.

1.02 TEMPORARY UTILITIES

A. Provide and pay for all temporary lighting and ventilation required for construction purposes.

B. Existing electrical, water, and heating facilities may be used. Do not waste electricity, heat, and water.

1.03 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for cellular telephone service to site. Provide at time of project mobilization.

B. Telecommunications services shall include:

1.04 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition. Location indicated on Drawings.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 INTERIOR ENCLOSURES

A. Provide temporary partitions as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

1.07 PROTECTIONS OF EXISTING SURFACES AND FURNISHINGS

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

1.08 PROTECTIONS OF THE WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings for walls, projections, jambs, and sills of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic from landscape areas.

1.09 DUST CONTROL

A. Execute Work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.10 SECURITY

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

B. Coordinate with Owner's security program.

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

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Designated existing on-site roads may be used for construction traffic.

1.12 PROGRESS CLEANING AND WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site at least weekly.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

E. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

F. Remove debris and rubbish from pipe chases, plenums, stud cavities and other closed or remote spaces, prior to enclosing the space.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Re-use of existing products.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations and procedures.

E. Procedures for Owner-furnished products.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: List of products to be furnished by Owner.

B. Document 01 60 01 - Substitution Request Form.

C. Section 02 41 00 - Demolition: Removal of existing items to be re-installed.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.02 NEW PRODUCTS

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

B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

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

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. After date of contract, the Owner may, at its option, consider formal requests from Contractor for substitution of products for those specified. One or more of the following conditions must be documented:
   1. Compliance with final interpretation of code requirements or insurance regulations.
   2. Unavailability of a specified Product through no fault of the Contractor.
   3. Inability of specified Product to perform or fit in designated place.
   4. Manufacturer's or fabricator's refusal to certify or guarantee performance of a specified product.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Requests for substitution must be submitted on approved Substitution Request Form - Section 01 60 01.
   2. Submit four copies of request for substitution for consideration. Limit each request to one proposed substitution.
   3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   4. The Architect will notify Contractor in writing of decision to accept or reject request.
   5. Architect will document approved substitutions during bidding period by addenda.

3.02 OWNER-SUPPLIED PRODUCTS

A. See Section 01 10 00 - Summary for identification of Owner-furnished products.

B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.

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

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

3.03 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

H. Prevent contact with material that may cause corrosion, discoloration, or staining.

I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SUBSTITUTION REQUEST FORM

TO: Robertson/Sherwood/Architect pc
132 East Broadway - Suite 540
Eugene, Oregon 97401

PROJECT: UO Autzen Visitor Locker Room Renovation
University of Oregon
Eugene, Oregon

SPECIFIED ITEM: _____
Section Paragraph Description

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION:_____

Attached data includes product descriptions, specifications, drawings, photographs, performance and test data adequate for evaluation of request including identification of applicable data portions.

Attached data also includes description of changes to Contract Documents and proposed substitution requires for proper installation.

The undersigned certifies following items, unless modified by attachments, are correct:

1. Proposed substitution does not affect dimensions shown on drawings.
2. Undersigned pays for changes to building design, including engineering design, detailing, and construction costs caused by proposed substitution.
3. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.
4. Maintenance and service parts available locally or readily obtainable for proposed substitution.

Undersigned further certifies function, appearance, and quality of proposed substitution are equivalent to or superior to specified item.

Submitted by: _____ Signature: _____ Firm: _____ Address:_____ _____ Date: _____ Tel: _____ Fax: _____ Attachments: _____	For use by Architect: □ Approved □ Approved as noted. □ Not Approved □ Received too late By: _____ Date: _____ _____ For use by University of Oregon Project Manager: □ Approved □ Approved as noted. □ Not Approved □ Received too late By: _____ Date: _____

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Laying out the work.

F. Cleaning and protection.

G. Starting of systems and equipment.

H. Demonstration and instruction of Owner personnel.

I. Closeout procedures, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures.

C. Section 01 50 00 - Temporary Facilities and Controls: Temporary interior partitions.

D. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

E. Section 02 41 00 - Demolition: Demolition of portions of existing structures; site utility demolition.

F. Section 07 84 00 - Firestopping.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

1.04 PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
2. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.

D. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

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

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
1. Review conditions of examination, preparation and installation procedures.
2. Review coordination with related work.

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

3.04 LAYING OUT THE WORK

A. Verify layout prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

D. Periodically verify layouts.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on Drawings.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on Drawings.
   2. Relocate items indicated on Drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
b. See Section 01 10 00 for other limitations on outages and required notifications.
c. Provide temporary connections as required to maintain existing systems in service.

4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
3. Patch as specified for patching new work.

I. Clean existing systems and equipment.

J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

K. Do not begin new construction in alterations areas before demolition is complete.

L. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-conforming work.

D. Execute cutting and patching to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

F. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

H. Restore work with new products in accordance with requirements of Contract Documents.

I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

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

L. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

M. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site daily and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING

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

3.13 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

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

B. Notify Architect when work is considered ready for Substantial Completion.

C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.

D. Owner will occupy all of the building as specified in Section 01 10 00.

E. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

F. Notify Architect when work is considered finally complete.

G. Complete items of work determined by Architect's final inspection.

END OF SECTION

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

D. Spare parts and maintenance materials.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment. Submit one hard copy and one copy in pdf format.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit 1 copy of completed documents at 75 percent completion. This copy will be reviewed and returned , with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two set hard copy and one set pdf format s of revised final documents in final form within 10 days prior to submission of final application for payment.
   5. Note: Per General Conditions, Form B-8, Owner will not make payments beyond 75 percent of the contract amount until Operation and Maintenance Manual have been submitted.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

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 Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

G. Monitoring Compliance: Architect and Owner's Project Manager will review status of concurrent recording of information on a monthly basis, prior to reviewing and processing applications for payment. Owner reserves right to withhold payment until documents are up-to-date.

3.02 OPERATION AND MAINTENANCE DATA

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Additional information as specified in individual product specification sections.

D. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.

4. Complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Include test and balancing reports.

J. Additional Requirements: As specified in individual product specification sections.

3.05 OPERATION AND MAINTENANCE MANUALS

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

B. Prepare data in the form of an instructional manual.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.

f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:
   a. Shop drawings and product data.
   b. Air and water balance reports.
   c. Certificates.

J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

3.07 SPARE PARTS AND MAINTENANCE MATERIALS

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

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

END OF SECTION

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

B. Removal and replacement of miscellaneous items and devices to facilitate Work.

C. Other demolition as required to complete the Work.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

E. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 PROJECT CONDITIONS

A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

B. Comply with other requirements specified in Section 01 70 00.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

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

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Provide, erect, and maintain temporary barriers and security devices.
   2. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   3. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   4. Do not close or obstruct roadways or sidewalks without permit.
   5. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.

3. Stop work immediately if adjacent structures appear to be in danger.

E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

F. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Dismantle existing construction and separate materials.
2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as shown.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.

C. Remove existing work as indicated and as required to accomplish new work.
1. Remove items indicated on drawings.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. See Section 01 10 00 for other limitations on outages and required notifications.
4. Verify that abandoned services serve only abandoned facilities before removal.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Floors and slabs on grade.

B. Concrete reinforcement.

C. Joint devices associated with concrete work.

D. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 02 41 00 - Demolition: Removal of existing concrete slabs.

B. Section 07 90 05 - Joint Sealers: Sealants for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.

C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

E. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).

F. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.

G. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.

H. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2011a.

I. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2012a.

J. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2012.

K. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2011b.

L. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2010a.

M. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.

N. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.

O. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2012.

P. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.

Q. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2010.

R. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit plant mix design.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

2.02 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal Portland type.
   1. Acquire all cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C 33.
   1. Acquire all aggregates for entire project from same source.

C. Fly Ash: ASTM C618, Class C or F.

D. Calcined Pozzolan: ASTM C618, Class N.

E. Water: Clean and not detrimental to concrete.

2.03 CHEMICAL ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

2.04 ACCESSORY MATERIALS

A. Chemical Hardener: Fluosilicate solution designed for densification of cured concrete slabs.

B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
   2. Minimum Compressive Strength at 28 Days: 7,000 psi.

C. Moisture-Retaining Cover: ASTM C171; regular curing paper, white curing paper, clear polyethylene, white polyethylene, or white burlap-polyethylene sheet.

D. Liquid Curing Compound: ASTM C309, Type 1, clear or translucent.

2.05 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System: Complying with ASTM C881/C881M and of Type required for specific application.

B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

C. Sealant and Primer: As specified in Section 07 90 05.

2.06 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

D. Normal Weight Concrete:
1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 3,000 psi.
2. Fly Ash Content: Maximum 20 percent of cementitious materials by weight.
3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
4. Water-Cement Ratio: Maximum 53 percent by weight.
5. Maximum Slump: 4 inches.
6. Maximum Aggregate Size: 3/4 inch.

2.07 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Verify that forms are clean and free of rust before applying release agent.

B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

C. Verify placement of reinforcing.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify Architect not less than 24 hours prior to commencement of placement operations.

D. Ensure reinforcement, inserts, and embedded parts will not be disturbed during concrete placement.

E. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Screed floors level, maintaining surface flatness of maximum 1/4 inch in 10 ft.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include ceramic tile with full bed setting system.
   2. Other Surfaces to Be Left Exposed: "Steel trowel" as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
      a. Chemical Hardener: After slab has cured, apply water-diluted hardener in three coats per manufacturer's instructions, allowing 24 hours between coats.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than 7 days.
   2. High early strength concrete: Not less than 4 days.

C. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.
      a. Moisture-Retaining Cover: Seal in place with waterproof tape or adhesive.
      b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.09 FIELD QUALITY CONTROL

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

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

D. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.

E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

END OF SECTION

REINFORCED UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete Block.

B. Mortar and Grout.

C. Reinforcement and Anchorage.

D. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.

C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

D. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2012.

E. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.

F. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.

G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.

I. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units and mortar and grout.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depth of 8 inches.
   2. Special Shapes: Provide non-standard blocks configured for corners.

2.02 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M Type N.

B. Portland Cement: ASTM C150/C150M, Type I.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144.

E. Grout Aggregate: ASTM C404.

2.03 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M Grade 40 (280).
   1. Deformed billet-steel bars.
   2. Unfinished.

2.04 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

2.05 MORTAR MIXES

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Interior, loadbearing masonry: Type S.

2.06 GROUT MIXES

A. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave at exposed locations; flush at concealed locations.

3.04 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar as work progresses.

D. Interlock intersections and external corners.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.05 REINFORCEMENT AND ANCHORAGE

A. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.

B. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
   1. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry units or saw to accommodate reinforcement.

3.06 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.

3.07 CONTROL JOINTS

A. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.08 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.09 CUTTING AND FITTING

A. Cut and fit for pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape,and location.

3.10 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Use non-metallic tools in cleaning operations.

END OF SECTION

ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specially fabricated plastic laminate faced cabinet units.

B. Countertops.

C. Cabinet hardware.

D. Preparation for installing utilities.

1.02 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2004.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

C. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.

D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

E. PS 1 - Structural Plywood; 2009.

F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

C. Product Data: Provide data for hardware accessories.

D. Samples: Submit actual samples of architectural cabinet construction, minimum 8 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.06 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards for Premium Grade.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

A. Softwood Lumber: NIST PS 20; Graded in accordance with, Grade I/Premium; average moisture content of 5-10 percent; species Douglas fir

B. Hardwood Lumber: NHLA; Graded in accordance with, Grade II/Custom; average moisture content of 5-10 percent; species Alder

2.04 PANEL MATERIALS

A. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as required.
   1. Use for painted components and concealed components.
   2. Use as backing for plastic laminate unless otherwise indicated.

B. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth two sides (S2S); use for drawer bottoms, dust panels, and other components indicated on drawings.

2.05 LAMINATE MATERIALS

A. High Pressure Decorative Laminate: NEMA LD 3, types as recommended for specific applications and as follows:
   1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, color as selected, .
   2. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, color as selected, .

2.06 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Fasteners: Size and type to suit application.

2.07 HARDWARE

A. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or surface mounted metal shelf standards and coordinated self rests, zinc-plated finish, for nominal 1 inch spacing adjustments.
   1. Product:
      a. Model 255 Standard and Model 256 Support Bracket by Knape & Vogt.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Drawer and Door Pulls: .
   1. Type: "U" shaped wire pull.
   2. Size: 4 inch centers, 1-3/8 inch extension.
   3. Finish: Steel with chrome finish.
   4. Product:
      a. No. 4484 by The Stanley Works.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

C. Drawer Slides:
   1. Type: Full extension.
   2. Static Load Capacity: Heavy Duty grade.
   3. Mounting: Bottom mounted.
   4. Stops: Integral type.
   5. Features: Provide self closing/stay closed type.
   6. Products:
      a. Model 3820 by Accuride International, Inc: www.accuride.com.

b. Substitutions: See Section 01 60 00 - Product Requirements.

D. Door Hinges:
1. Type: Interleaf casework hinge.
2. Finish: Steel with polished finish.
3. Product:
a. No. 1592-4 by The Stanley Works.
b. Substitutions: See Section 01 60 00 - Product Requirements.

E. Door Catches:
1. Type: Adjustable magnetic.
2. Finish: Steel with polished finish.
3. Product:
a. No. CD26 by The Stanley Works.
b. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 FABRICATION

A. Cabinet Style: As indicated on Drawings.

B. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Provide cutouts for plumbing fixtures, inserts, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floor using appropriate angles and anchorages.

F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2011a.

B. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

C. FM 4991 - Approval of Firestop Contractors; Factory Mutual Research Corporation; 2001.

D. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

F. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the specified fire ratings when tested in accordance with methods indicated.
   1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Approved by Factory Mutual Research under FM Standard 4991, Approval of Firestop Contractors, or meeting any two of the following requirements:.
   2. With minimum 3 years documented experience installing work of this type.
   3. Able to show at least 5 satisfactorily completed projects of comparable size and type.
   4. Licensed by authority having jurisdiction.
   5. Approved by firestopping manufacturer.

D. Installing Mechanic's Qualifications: Trained by firestopping manufacturer and able to provide evidence thereof.

1.06 REGULATORY REQUIREMENTS

A. Conform to Oregon Structural Specialty Code for fire-resistance ratings, surface burning characteristics, F-Rating and T-Rating Requirements.

B. Conform to Oregon Structural Specialty Code, Section 712, 712.3 and 712.4 for exceptions allowed by code.

C. F-Rated Firestopping Systems: Provide system with F-Ratings indicated, as determined by ASTM E 814, but not less than fire resistive rating of construction penetrated.

D. T-Rated Firestopping Systems: For following conditions, provide system with T-Ratings indicated, as well as F-Ratings, as determined by ASTM E814, where system protects items exposed to potential contact with adjacent materials in occupied spaces.
   1. Penetration located outside wall cavities.
   2. Penetrations located outside fire-resistive shaft enclosures.
   3. Penetrations located in construction containing fire-protection-rated openings.
   4. Penetrating items larger than 4 inches (100 mm) in diameter nominal or 16 sq in (100 sq cm) in overall cross-sectional area.

E. For joints in the following construction, provide fire-resistive joint systems that resist spread of fire, resist passage of smoke and other gases, and maintain original fire-resistive rating of assembly:
   1. Fire-resistive non-load bearing walls and partitions.

F. Fire Resistance of Joint Assembly: Assembly rating indicated for the construction assembly as determined by UL 2079 and UBC Standard 26-9.

G. Systems and devices to 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 par 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.

H. Performance Requirements: Capable of withstanding standard fire and hose stream test (F-Rating) and limit temperature rise (T-Rating) of penetrations on protection side as required by code. Conform to UBS Standard 7-5.

1.07 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING - GENERAL REQUIREMENTS

A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

2.02 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E814 that has F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and that meets all other specified requirements.

2.03 MATERIALS

A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
1. Durability and Longevity: Permanent.
2. Color: Dark grey.

B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authority having jurisdiction.

C. Install labeling required by code.

3.04 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

1.02 RELATED REQUIREMENTS

A. Section 09 30 00 - Tiling: Sealant used as tile grout.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2010.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2011.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2011a.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, and color availability.

C. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

D. Preconstruction Field Test Report: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in QUALITY ASSURANCE below.

E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   2. Submit not fewer than four pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   4. For materials failing test, obtain joint-sealant manufacturer's written instructions for corrective measure including use of specially formulated primers.

1.06 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a two year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

A. Elastomeric Sealant (Type A): Multi-component, chemical curing, non-staining, non-bleeding, capable of continuous ware immersion, none-sagging type; color as selected; meeting the following minimum requirements:
   1. Elongation Capability:25 percent
   2. Service Temperature Range:-40 to 180 degrees F.
   3. Shore A Hardness Range:+40
   4. Products:
      a. Dynatred by Pecora Corporation.
      b. Sonolastic Two-Part by BASF Construction Chemicals, LLC: www.buildingsystems.basf.com.
      c. Substitutions: Section 01 60 00 - Product Requirements.

B. MS Polymer Sealant (Type B): ASTM C920, Type S, Grade NS, Class 100/50; single or two-part component silyl-terminated polyether, moisture curing, non-staining, non-bleeding, capable of continuous water immersion, con-sagging type; multiple colors as selected to match adjacent materials; meeting the following minimum requirements:
   1. Capability:+/- 50 percent
   2. Service Temperature Range:-40 to 220 degrees F.
   3. Shore A Hardness Range:+10 to +20
   4. Products:
      a. Sonolastic 150 VLM by BASF Construction Chemicals, LLC: www.buildingsystems.basf.com.
      b. Substitutions: Section 01 60 00 - Product Requirements.

C. Type C - Silicone Sealant: ASTM C920, Grade NS, Class 25, Uses NT, A, G, M, O; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Movement Capability: Plus and minus 25 percent.
   3. Service Temperature Range: -65 to 180 degrees F.
   4. Shore A Hardness Range: 15 to 35.
   5. Products:
      a. Dow Corning Corporation; 786 Mildew Resistant: www.dowcorning.com.
      b. Momentive Performance Materials, Inc (GE Silicones products); Sanitary SCS1700: www.momentive.com.
      c. Tremco Global Sealants; Tremsil 200: www.tremcosealants.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; closed cell polyethylene; bond breaker type; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
   1. Width/depth ratio of 2:1.
   2. Neck dimension no greater than 1/3 of the joint width.
   3. Surface bond area on each side not less than 75 percent of joint width.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

3.06 SCHEDULE

A. Type A - Elastomeric:
   1. Interior concrete slab joints.

B. Type B - MS Polymer:
   1. Sheet metal work.
   2. Perimeter of steel door and relite frames.
   3. Other joints at indicated on Drawings.

C. Type C - Silicone:

1. Perimeter of plumbing fixtures.

END OF SECTION

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated steel doors and frames.

B. Thermally insulated steel doors.

C. Accessories, including matching panels.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

A. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

C. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 DOORS AND FRAMES

A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.02 STEEL DOORS

A. Exterior Doors :
   1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.

2. Core: Polystyrene foam.
3. Thickness: 1-3/4 inches.
4. Top Closures for Outswinging Doors: Flush with top of faces and edges.
5. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
6. Texture: Smooth faces.
7. Weatherstripping: Separate, see Section 08 71 00.
8. Finish: Factory primed, for field finishing.

B. Panels: Same construction, performance, and finish as doors.

2.03 STEEL FRAMES

A. General:
1. Comply with the requirements of grade specified for corresponding door.
   a. ANSI A250.8 Level 3 Doors: 14 gage frames.
2. Finish: Same as for door.
3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
5. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

B. Exterior Door Frames: Face welded, seamless with joints filled.
1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
2. Weatherstripping: Separate, see Section 08 71 00.

2.04 ACCESSORY MATERIALS

A. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

B. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

D. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.05 FINISH MATERIALS

A. Galvanized Metal Primer: Primer specified in Section 09 90 00.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. Coordinate frame anchor placement with wall construction.

C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

D. Coordinate installation of hardware.

3.04 TOLERANCES

A. Clearances Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Installation of Owner furnished hardware.

B. Hardware for hollow steel doors.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary of Work: Description of Owner furnished hardware.

B. Section 08 11 13 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

A. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; 2004.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

1.05 QUALITY ASSURANCE

A. Installer: Company specializing is installation of commercial door hardware with five years of experience.

1.06 COORDINATION

A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.

B. Coordinate Owner's keying requirements during the course of the Work.

PART 2 PRODUCTS

2.01 DOOR HARDWARE - GENERAL

A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

B. Provide all items of a single type of the same model by the same manufacturer.

2.02 PRODUCTS

A. Owner Furnished Contractor Installed.

2.03 KEYING

A. By Owner.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Mounting heights for hardware from finished floor to center line of hardware item:
   1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."

3.02 ADJUSTING

A. Adjust work under provisions of Section 01 70 00.

B. Adjust hardware for smooth operation.

3.03 SCHEDULE

A. Hardware Group 1: Exterior Hollow Metal Door Pair

6	Ea	Butts
2	Ea	Exit Device
1	Ea	Auto-Flushbolts
1	Ea	Coordinator
2	Ea	Closers
1	Set	Seals
2	Ea	Door Bottom and Drip
1	Ea	Threshold

END OF SECTION

NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ceiling framing.

B. Framing accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 2226 - Suspension Systems: Ceiling and soffit suspension system.

B. Section 09 22 36.23 - Metal Lath.

1.03 REFERENCE STANDARDS

A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2011a.

B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.

C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007.

D. ASTM E 580 - Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience.

PART 2 PRODUCTS

2.01 FRAMING MATERIALS

A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/360 at 10 psf.
   1. Studs: C shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C shaped.

B. Fasteners: ASTM C1002 self-piercing tapping screws.

C. Anchorage Devices: Drilled expansion bolts.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that rough-in utilities are in proper location.

3.02 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

METAL LATH

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lath for Portland cement plaster.

B. Furring for metal lath.

C. Metal ceiling framing.

1.02 RELATED REQUIREMENTS

A. Section 09 24 00 - Portland Cement Plastering.

1.03 REFERENCE STANDARDS

A. ASTM C847 - Standard Specification for Metal Lath; 2012.

B. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007.

C. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2012a.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

PART 2 PRODUCTS

2.01 FRAMING AND LATH ASSEMBLIES

A. Provide completed assemblies with the following characteristics:
   1. Maximum Deflection of Horizontal Assemblies: 1:360 deflection under dead loads .

2.02 FRAMING MATERIALS

A. Furring Channels: Formed steel, minimum 0.020 inch thick, 3/8 inch deep x 7/8 inch high, splicing permitted; galvanized.

B. Main Ceiling Channels: Formed steel, asphalt coated, minimum 0.05 inch thick, 3/4 inch deep x 1-1/2 inch high, single piece, no splicing; galvanized.

C. Hangers: Steel wire, of size and type to suit application, to support ceiling components in place to deflection limits as indicated.

2.03 LATH

A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.
   1. Weight: 3.4 lb/sq yd.

B. Corner Mesh: Formed sheet steel, minimum 0.018 inch thick, perforated flanges shaped to permit complete embedding in plaster, minimum 2 inch size; same finish as lath.

C. Strip Mesh: Expanded metal lath, same weight as lath, 2 inch wide x 24 inch long; same finish as lath.

D. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, maximum possible lengths.
   1. Material: Formed sheet steel with rust inhibitive primer, expanded metal flanges.

2.04 ACCESSORIES

A. Fasteners: ASTM C1002 self-piercing tapping screws.

B. Tie Wire: Annealed galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that substrates are ready to receive work and conditions are suitable for application.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

A. Install lath and furring for Portland cement plaster in accordance with ASTM C1063.

3.03 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

G. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.

H. Laterally brace suspension system.

3.04 CONTROL JOINTS

A. Locate joints as indicated on drawings.

B. Construct control joints of back-to-back casing beads set 1/4 inch apart. Set both beads over 6 inch wide strip of polyethylene sheet.

3.05 LATH INSTALLATION

A. Apply metal lath taut, with long dimension perpendicular to supports.

B. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.

C. Lap sides of diamond mesh lath minimum 1-1/2 inches.

D. Attach metal lath to metal supports using screws at maximum 6 inches on center.

E. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.

F. Place corner bead at external wall corners; fasten at outer edges of lath only.

G. Place base screeds at termination of plaster areas; secure rigidly in place.

H. Place 4 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

I. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.

J. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.

K. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.06 TOLERANCES

A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet.

B. Maximum Variation from True Position: 1/8 inch.

END OF SECTION

PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Portland cement plaster for installation over metal lath.

1.02 RELATED REQUIREMENTS

A. Section 09 22 36.23 - Metal Lath: Metal furring and lathing for plaster.

B. Section 09 90 00 - Painting and Coating: Field finishing.

1.03 REFERENCE STANDARDS

A. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.

B. ASTM C206 - Standard Specification for Finishing Hydrated Lime; 2003 (Reapproved 2009).

C. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2012a.

D. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering; 2006.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data: Provide data on plaster materials, characteristics and limitations of products specified.

C. Samples: Submit two samples, 12 x 12 inch in size illustrating finish color and texture.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C 926.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.06 FIELD CONDITIONS

A. Do not apply plaster when substrate or ambient air temperature is under 50 degrees F or over 80 degrees F.

B. Maintain minimum ambient temperature of 50 degrees F during installation of plaster and until cured.

PART 2 PRODUCTS

2.01 PLASTER MATERIALS

A. Portland Cement, Aggregates, and Other Materials: In accordance with ASTM C926.

B. Portland Cement: ASTM C150, Type I or II.

C. Lime: ASTM C206, Type S.

D. Aggregate: Sand, suitable for plaster work.

E. Water: Clean, fresh, potable and free of mineral or organic matter that could adversely affect plaster.

F. Admixture: Air entrainment type .

G. Plaster Mix Reinforcement: Glass fibers, chopped to 1/2 inch nominal length, Type A/R alkali resistant.

H. Bonding Agent: ASTM C932; type recommended for bonding plaster to concrete surfaces .

2.02 METAL LATH

A. Metal Lath and Accessories: As specified in Section 09 22 36.23.

B. Beads, Screeds, and Joint Accessories: As specified in Section 09 22 36.23.

2.03 PLASTER MIXES

A. Over Metal Lath: Three-coat application, mixed and proportioned in accordance with manufacturer's instructions.

B. First Coat :
   1. One part Portland cement.
   2. Minimum 1/2 and maximum 3/4 part hydrated lime.
   3. Minimum 3 and maximum 4 parts aggregate, per sum of cementitious materials.
   4. Reinforcement at 2 lbs per sack of cement.

C. Second Coat: Same as first coat, except minimum 3 parts and maximum 5 parts aggregate.

D. Finish Coat:
   1. One part portland cement.
   2. Minimum 3/4 and maximum 1-1/2 parts lime.
   3. 3 parts 20 mesh sand, per sum of cementitious materials.
   4. Reinforcement at 1 lbs per sack of cement.

E. Mix only as much plaster as can be used prior to initial set.

F. Mix materials dry, to uniform color and consistency, before adding water.

G. Protect mixtures from freezing, frost, contamination, and excessive evaporation.

H. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify the suitability of existing conditions before starting work.

B. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.

3.02 PLASTERING

A. Apply plaster in accordance with ASTM C926.

B. Three-Coat Application Over Metal Lath:
   1. Apply first coat to a nominal thickness of 3/8 inch.
   2. Apply second coat to a nominal thickness of 3/8 inch.
   3. Apply finish coat to a nominal thickness of 1/8 inch.

C. Moist cure base coats.

D. Apply second coat immediately following initial set of first coat.

E. Apply bonding agent to prepared second coat surfaces; apply finish coat with steel trowel to consistent thickness.

F. Finish Texture: Float to a consistent and smooth finish.

G. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.

H. Moist cure finish coat for minimum period of 48 hours.

3.03 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

END OF SECTION

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-In-Place Concrete: Concrete substrate.

B. Section 04 27 31 - Reinforced Unit Masonry: Concrete block substrate.

1.03 REFERENCE STANDARDS

A. ANSI A108 Series/A118 Series/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2012.1.
   1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2012.1.
   2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar; 2012.1.
   3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex Portland Cement
   4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2012.1.
   5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2012.1.
   6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 2012.1.
   7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 2012.1.
   8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2012.1.
   9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2012.1.

B. ANSI A118.13 - American National Standard Specifications for Bonded Sound Reduction Membranes for Thin-Set Ceramic Tile Installation; 2012.1.
   1. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2012.

C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 x 18 inches in size illustrating pattern, color variations, and grout joint size variations.

D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.05 QUALITY ASSURANCE

A. Maintain one copy of The Tile Council of North America Handbook and ANSI A108 Series/A118 Series on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum 5 years of documented experience.

C. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.08 EXTRA MATERIALS

A. Provide 10 sq. ft of each size, color, and surface finish of tile specified.

PART 2 PRODUCTS

2.01 TILE

A. Ceramic Mosaic Tile Type CT-A: ANSI A137.1, and as follows:
   1. Moisture Absorption: 0 to 0.5 percent.
   2. Size and Shape: 2 inch square.
   3. Edges: Square.
   4. Surface Finish: Unglazed.
   5. Colors: As scheduled.
   6. Trim Units: Matching bead and cove shapes in sizes coordinated with field tile.
   7. Product:
      a. Keystone Mosaics, Unglazed, Porcelain Tile, Dal-Tile: www.daltile.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Glazed Wall Tile Type CT-B: ANSI A137.1, and as follows:
   1. Moisture Absorption: 3.0 to 7.0 percent.
   2. Size and Shape: 6 inch square.
   3. Edges: Cushioned.
   4. Surface Finish: High gloss.
   5. Trim Units: Matching bead and bullnose shapes in sizes coordinated with field tile.

2.02 SETTING MATERIALS

2.03 MORTAR MATERIALS

A. Mortar Bed Materials: Portland cement, sand, latex additive and water.

B. Mortar Bond Coat Materials:
   1. Dry-Set Portland Cement type: ANSI A118.1.
   2. Latex-Portland Cement type: ANSI A118.4.

2.04 GROUTS

A. Standard Grout: ANSI A118.6 standard cement grout.
   1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.

2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Color(s): As selected by Architect from manufacturer's full line.
4. Products:
   a. Substitutions: See Section 01 60 00 - Product Requirements.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
1. Composition: Water-based colorless silicone.

2.05 THICK-BED MATERIALS

A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.

B. Cleavage Membrane: 4 mil thick polyethylene film.

C. Grout: Any type specified in ANSI A118.6 or A118.7.

2.06 THIN-SET ACCESSORY MATERIALS

A. Joint Sealer: Penetrating type.
1. TileLab Surfacegard Penetrating Sealer by Custom Building Products: www.custombuildingproducts.com
2. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and The Tile Council of North America Handbook recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

I. Grout tile joints. Use standard grout unless otherwise indicated.

J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - MORTAR BED METHODS

A. Cleavage Membrane: Lap edges and ends.

B. Mortar Bed Thickness: 5/8 inch, unless otherwise indicated.

3.05 INSTALLATION - WALL TILE

A. Over interior concrete and masonry install in accordance with The Tile Council of North America Handbook Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.06 CLEANING AND SEALING

A. Clean tile and grout surfaces.

B. Apply two coats of penetrating grout sealer as instructed by manufacturer.

3.07 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints and other coatings.

C. See Schedule - Surfaces to be Finished, at end of Section.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames: Shop-primed doors and frames.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products, including VOC content.

C. Samples: Submit two paper chip samples, 8-1/2 x 11 inch in size illustrating range of colors available for each surface finishing product scheduled.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.

1.05 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 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements, for additional provisions.

B. Supply 1 gallon of each color; store where directed.

C. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Base Manufacturer: Benjamin Moore & Company: www.benjaminmoore.com.
   2. Glidden Professional: www.gliddenprofessional.com.
   3. Sherwin-Williams Company: www.sherwin-williams.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. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   3. Supply each coating material in quantity required to complete entire project's work from a single production run.
   4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Architect after award of contract.

2.03 PAINTS AND COATINGS

A. Exterior/Interior Galvanized Metal Primer:
   1. Fresh Start High-Hiding All Purpose Primer 046 by Benjamin Moore & Company.

B. Block Filler/Primer:
   1. Super Spec Masonry Interior/Exterior Hi-Build Block Filler 206 by Benjamin Moore & Company.

C. Interior Metal Primer:
   1. Super Spec HP Acrylic Metal Primer P04 by Benjamin Moore & Company.

D. Interior Gypsum Board Primer:
   1. Fresh Start Multi-Purpose Primer 023 by Benjamin Moore & Company.

E. Interior Acrylic Latex Enamel:
   1. Regal Classic Premium Interior Paint 216 by Benjamin Moore & Company.

F. Concrete Floor Sealer:
   1. Super Spec HP Clear Acrylic Sealer P27 by Benjamin Moore & Company.

G. Interior/Exterior Masonry Primer.
   1. Super Spec Masonry Interior/Exterior Acrylic Masonry Sealer N066 by Benjamin Moore & Company.

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Plaster and Stucco: 12 percent.
   3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   4. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

I. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

J. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

K. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution,

ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

L. 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. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

E. Sand metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

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

3.05 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
1. Items fully factory-finished unless specifically noted.
2. Fire rating labels, equipment serial number and capacity labels.
3. Stainless steel items.
4. Mechanical and electrical components.
5. Exposed metal ceilings.
6. Exposed steel structural components.

B. Paint surfaces as described under Schedule - Exterior and Interior below.

3.06 SCHEDULE - EXTERIOR

A. Galvanized Metal:
1. Prepare surfaces in accordance with coating manufacturer's recommendations.
2. Touch-up shop primer as necessary; apply one coat primer to non-primed surfaces.
3. Two coats of exterior acrylic latex enamel, semi-gloss.
4. Colors: As selected.

B. Non-Galvanized Metal:
1. Prepare surfaces in accordance with coating manufacturer's recommendations.
2. Touch-up shop primer as necessary; apply one coat primer to non-primed surfaces.
3. Two coats of exterior acrylic latex enamel, semi-gloss.
4. Colors: As selected.

3.07 SCHEDULE - INTERIOR

A. Metal Doors and Frames (New):
1. Prepare surfaces in accordance with coating manufacturer's recommendations.
2. Touch-up shop primer as necessary; field prime non shop-primed metal.
3. Two coats of interior acrylic latex enamel, egg-shell gloss.

4. Colors: As selected.

B. Gypsum Board (New):
   1. Prepare surfaces in accordance with coating manufacturer's recommendations.
   2. One coat interior primer.
   3. Two coats of interior acrylic latex enamel, egg-shell gloss.
   4. Colors: As selected.

C. Portland Cement Plaster (New):
   1. Prepare surfaces in accordance with coating manufacturer's recommendations.
   2. One coat interior/exterior masonry primer.
   3. Two coats of interior acrylic latex enamel, semi-gloss.
   4. Colors: As selected.

D. Concrete Unit Masonry (New):
   1. Prepare surfaces in accordance with coating manufacturer's recommendations.
   2. One coat interior/exterior block filler/primer.
   3. Two coats of interior acrylic latex enamel, egg-shell gloss.
   4. Colors: As selected.

E. Concrete Floors:
   1. Prepare surfaces in accordance with coating manufacturer's recommendations.
   2. Two coats concrete floor sealer.
   3. Color: Clear.

F. Existing Surfaces (Metal Doors and Frames, Gypsum Board, Concrete Masonry):
   1. Prepare surfaces in accordance with coating manufacturer's recommendations.
   2. Touch-up exposed substrate with primer as necessary.
   3. Two coats of interior acrylic latex enamel, gloss to match existing.
   4. Colors: As selected.

END OF SECTION

CURTAINS AND RODS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steel support rods.

B. Curtains.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordinate location and installation of concealed blocking for support of rods.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for rods, accessories and curtain fabric.

C. Shop Drawings: Indicate end track location, width of opening, location of blocking for anchors, appurtenances and interferences, adjacent construction, and support bracket details.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 CURTAINS

A. Material: 100 percent polyester; 12.0 ounce weight; 54 inch width; color as selected.
   1. Slumber by Knoll Textiles: www.knolltextiles.com.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fabrication: Pleated.
   1. Hem top, bottom and edges.
   2. provide top edge with stainless steel grommets at 6 inches on center.

2.02 COMPONENTS

A. Rods: Aluminum tubing, 1-1/2 inch diameter; Schedule 40, 0.140 inch wall thickness; satin finish; similar to Julius Blum Connectorail Pipe .

B. Wall Return: Aluminum tubing, 1-1/2 inch diameter; Schedule 40, 0.140 inch wall thickness; 3 inch radius with flanged end for wall mounting; similar to Julius Blum Wall Return 7473.

C. Wall Flange: Aluminum, to accept 1-1/2 inch diameter tubing; concealed mounting.

D. Anchors: Stainless steel to concrete masonry substrate.

E. Curtain Hooks: Stainless steel.

F. Products:
   1. Connectorail System Components by Julius Blum & Company: www.juliusblum.com.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FINISHES

A. Aluminum: Clear anodized aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that concealed anchors are in correct position.

3.02 INSTALLATION

A. Install rods in accordance with manufacturer's instructions.

B. Hang drapery material from track assembly.

3.03 ADJUSTING

A. Adjust drapery hardware for smooth operation.

END OF SECTION

WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Corner Guards (CG): Surface mounted; one-piece unit without splices, installed with screws.
   1. Material: Type 304 stainless steel, No. 4 finish.
   2. Thickness: 18 gage, 0.05 inch.
   3. Styles: Provide 90 degree corners and wall end protectors.
   4. Products:
      a. InPro Corporation Stainless Steel Surface Mount Corner Guards www.inprocorp.com..
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FABRICATION

A. Pre-drill holes for attachment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. Position corner guard 6 inches above finished floor to 48 inches high.

3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

END OF SECTION

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Accessories for toilet rooms and showers.

B. Grab bars.

C. Installation of Owner Furnished toilet accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Description of Owner furnished items.

B. Section 04 27 31 - Reinforced Unit Masonry: Substrate.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (ADA Standards for Accessible Design).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 TOILET ROOM ACCESSORIES

A. Grab Bars: Stainless steel, nonslip grasping surface finish.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/2 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar; anti-slip surface.
      c. Length and Configuration: As indicated on drawings.
         1) GB-1: Straight, 24 inches.
         2) GB-2: L-shape, 24 inches x 36 inches.
         3) GB-3: Straight, 60 inches, intermediate support.
      d. Products:
         1) Series 5806.99 by Bobrick Washroom Equipment Inc: www.bobrick.com.
         2) Substitutions: Section 01 60 00 - Product Requirements.

2.02 SHOWER AND TUB ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting.
   1. Products:
      a. Model B-207 by Bobrick Washroom Equipment Inc: www.bobrick.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Shower Curtain:
   1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
   2. Size: 36 by 72 inches, hemmed edges.

3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
4. Color: As selected from manufacturer's standard colors.
5. Shower curtain hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
6. Products:
    a. Model 204-2 by Bobrick Washroom Equipment Inc: www.bobrick.com.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

C. Folding Shower Seat: Wall-mounted recessed; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand and L-shaped seat.
1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.

D. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights and Locations: As required by accessibility regulations

END OF SECTION

GENERAL MECHANICAL PROVISIONS

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

A. General mechanical requirements specified in Division 20 apply to all work performed in Divisions 21, 22, 23, and 25.

B. The Contract Documents are complementary. What is required by any one, as affects this Division, shall be as binding as if repeated herein.

C. Separation of this Division from other Contract Documents shall not be construed as segregation of the Work.

D. Particular attention is called to Instructions to Bidders, General Conditions, Drawings and Specifications, and modifications incorporated in the documents before execution of the Agreement.

E. Location of equipment on Drawings is approximate. Plan exact location with respect to site measurements and work of other trades prior to starting work. If measurements differ slightly, modify work. If measurements differ substantially, notify Architect/Engineer and Owner's Authorized Representative prior to fabrication.

F. Make minor changes in equipment connections and equipment locations as directed or required before rough-in without extra cost.

1.02 WORK INCLUDES

A. Contractor shall furnish and install all necessary equipment and labor to provide the specified mechanical systems. The Work includes but is not limited to:
   1. Provide new air handling equipment, heating, and ventilation for new locker area, and extend / rework existing HVAC services to other areas as indicated to support upgrades to building layout.
   2. Provide new domestic water heaters, showers, treatment room sink, and associated piping, drains, and other fixtures to support plumbing upgrades to the building.

B. Omissions: Omission of expressed reference to any item of labor or material necessary for the proper execution of the Work shall not relieve responsibility from providing such additional labor or material.

1.03 DEFINITIONS

A. Authority Having Jurisdiction (AHJ): The governmental agency or sub-agency which regulates the construction process.

B. Owner's Authorized Representative (OAR): Owner's representative with authority to act on Owner's behalf.

1.04 COORDINATION

A. Contractor shall coordinate all work in Divisions 20 through 25 with work specified in other Divisions to provide a complete installation. Expense of changes required because of lack of supervision or coordination shall be borne by the Contractor. Such changes shall be to the satisfaction of and directly supervised by the Owner's Authorized Representative.

B. Check drawings of other trades to avert possible installation conflicts. Should major changes from original drawings be necessary to resolve such conflicts, notify Architect/Engineer and secure written approval and agreement on necessary adjustments before installation is started.

C. Architectural drawings govern all other drawings. Consult in detail the door swings, counter heights and similar items affecting work before rough-in.

1.05 SUBMITTALS AND SHOP DRAWINGS

A. Provide in accordance with SECTION 01 30 00 – ADMINISTRATIVE REQUIREMENTS.

B. Manufacturers' product data and Shop Drawings shall be submitted as follows:
1. Prior to delivery of submittal documents, contractor shall review all manufacturers' product data, Shop Drawings, and samples for compliance and conformance with specifications, and shall incorporate changes, corrections and deviations known to exist. Contractor shall affix his review stamp to documents and acknowledge such review by his signature.
2. Submittals for manufacturers' product data and Shop Drawings shall be in sufficient detail to establish conformance with specified requirements and as outlined under Product Data, Shop Drawings and Samples described below. Specific features shall be marked with color contrasting ink on printed literature. If translucent highlighting method is used, highlighted print shall be reproducible by photocopy.
3. A complete submittal document shall be assembled in one or more three-ring, loose-leaf binders. The complete document shall consist of all items identified in the submittal schedule.
4. Order of the bound contents shall be same as in the submittal schedule.
5. Each item or logical group of items shall be identified by a separate tab marker in the bound document (example: "pumps," "air compressors," etc.).
6. Each bound document shall contain a Table of Contents which lists each tab and each item under each tab.
7. Catalog data and Shop Drawings (each separate item) shall be identified by the name of the item, the system, the applicable specification paragraph number, drawings number, and schedule.
8. Multiple submissions or submissions of manufacturers' product data or Shop Drawings other than in one complete assembled document are not acceptable except where prior written approval has been obtained. In such cases, a list of data to be submitted later shall be included with the first submission.

C. Resubmittals shall be complete substitutions of original submittals.

D. Submittal information required must be provided regardless of whether the proposed item or work is in exact accordance with specification requirements.

E. No item requiring approved submittal information shall be delivered to the site or installed or any associated work performed until required submittals have been approved for compliance with the Contract Documents by the Engineer. Any item delivered to the site or installed, or any work performed without an approved submittal, which is deficient in any way, shall be removed from the site at no expense to Owner.

F. Manufacturers’ Product Data:
1. Manufacturers' product data shall consist of one or more levels of manufacturer’s information as described below and as requested in the submittal schedule. The three levels of information include: manufacturer's list, manufacturer's catalog data, and manufacturer's technical and engineering data. Mark submittal information under each

level to identify applicable products, models, options, and other information as it relates to the specifications.

2. Manufacturer's List. Manufacturer's list shall include a typewritten list of manufacturer's name, sizes and model or catalog numbers, referenced to the specification section.
3. Manufacturer's Catalog Data. Manufacturer's catalog data shall include standard catalog information marked to indicate specific equipment proposed and point of operation, if appropriate. Include installation instructions.
4. Manufacturer's Technical and Engineering Data. Manufacturer's Technical and Engineering Data shall include materials, dimensions, details, installation instructions, weights capacities, illustrations, wiring diagrams, control diagrams, piping diagrams, connection diagrams, performance data (including performance curves), mix designs, and any other information required for a complete and thorough evaluation of the equipment or items specified, and to verify compliance with the specifications. Such data shall be clearly marked to indicate point of operation and performance as required by the specifications. Control diagrams or control schematics, where specified and required by the submittal schedule, shall include a detailed schematic of the proposed control modifications and their interface with existing control equipment, where appropriate, and a manufacturer and model number listing of all proposed control components shown on the control schematic.

G. Shop Drawings:
1. Shop drawings are construction drawings of an item being manufactured specifically for this project. Shop Drawings include dimensions, construction details, weights, and additional information to identify the physical features of the piece of equipment.
2. Submit Shop Drawings in the form of blueline reproductions. After review by Engineer, contractor shall make appropriate changes on original, reproduce, and distribute to the necessary parties including the Architect/Engineer.
3. Minimum scale for Shop Drawings shall be 1/4" = 1'0" or larger if required for clarity.

H. Submittal Schedule
1. Submittals for manufacturers' product data, Shop Drawings, and samples are as indicated below. Each item requiring a submittal is given the following code.

1 - Manufacturer's list
2 - Manufacturer's catalog data
3 - Manufacturer's technical and engineering data
4 - Shop Drawings
5 - Samples
6 - Certificates
7 - Test data
8 - Worker's qualifications
9 - Special requirements, see individual specification sections

Division 20 - General Mechanical		Code
20 05 13	Motors for Mechanical Equipment	2,3.9
20 05 14	Motor Control Devices for Mechanical Equipment	2,3
20 05 19	Meters and Gauges for Mechanical Service	2
20 05 23	General Duty Valves for Mechanical Service	2,3
20 05 29	Pipe Hangers, Supports, Sleeves, and Seals	2
20 05 45	Vibration Isolation for Mechanical Systems	2
20 05 48	Seismic Control for Mechanical Systems	9
20 05 53	Identification for Mechanical Equipment	2
20 05 93	Testing, Adjusting, and Balancing for Mechanical	9

Division 21 – Fire Protection

21 13 16	Dry-Pipe Suppression System	1,4,6,9

Division 22 – Plumbing

22 07 00	Plumbing Insulation	2
22 11 02	Plumbing Piping	2
22 12 00	Plumbing Specialties	2
22 33 19	Fuel-Fired Domestic Water Heaters	2,3
22 42 00	Commercial Plumbing Fixtures	2

Division 23- HVAC

23 07 00	HVAC Insulation	2,3
23 11 02	Facility Fuel Piping	
23 31 13	Metal Ductwork	2,3
23 31 19	Ductwork Hangers, Supports, and Seals	2
23 33 00	Ductwork Accessories	2,3
23 34 00	HVAC Fans	2,3
23 37 00	Air Outlets and Inlets	2
23 54 16	Gas-Fired Duct Furnaces	2,3

Division 25 – Integrated Automation

25 10 00	Building Automation System	2,3
25 30 00	Field Installed Control System Components	9
25 90 00	Automatic Controls Sequence of Operations	9

1.06 QUALITY ASSURANCE

A. All materials and equipment provided hereunder shall be installed and started in complete conformance with the manufacturer's recommendations.

B. Asbestos products or equipment or materials containing asbestos shall not be used.

C. Certify that each welder has passed the American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.

1.07 DESIGN REQUIREMENTS

A. Equipment and systems provided hereunder shall be rated to provide performance specified and scheduled on drawings at the elevation of the project site.

B. Materials and equipment provided hereunder shall be rated for the service conditions of the system to which they are connected including but not limited to temperature, pressure, and humidity.

1.08 CODES, STANDARDS

A. Applicable codes and standards shall determine minimum requirements for materials, methods, and labor practices not otherwise stated herein.

B. Work shall comply with the Americans with Disabilities Act (ADA).

1.09 TEMPORARY SERVICES

A. Provide in accordance with SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS as required for completion of work. Provide additional filters as required to keep areas clean during construction.

B. Maintain existing systems operational. Damage to existing equipment resulting from work under this Contract repaired at no expense to Owner.

1.10 OPERATIONS AND MAINTENANCE MANUALS

A. Bind manuals in three-ring, high quality vinyl covered binders, clearly indexed and provided with thumb tabs for each item or product. Include a directory of all subcontractors and maintenance contractors with names, addresses, and telephone numbers, indicating the area of responsibility for each. Index tabs shall match submittal schedule and include any additional information required for operations and maintenance, whether in submitted schedule or not.

B. Maintenance instructions shall indicate routine-type work with step-by-step instructions that should be performed to ensure long life and proper operations. Recommended frequency of performance shall also be included.

C. Provide copy of approved submittal for each product included in manual.

D. Provide printed copy and electronic configuration files for all packaged equipment control systems furnished with equipment.

E. Mark the model actually provided where the literature covers more than one model. Include four copies of all submittal data corrected to "as-built" conditions within the manual.

F. Provide a composite summary table indicating each item of equipment listed in the operations and maintenance manual and its required maintenance and time period. This summary table shall be the first section in the O&M manual.

G. Operation and Maintenance Schedule
1. Manuals shall contain full information for each item of mechanical, electrical, or other operating equipment, as given the following code.
   1- Manufacturer's instructions for installation, startup, operation, inspection, and maintenance.
   2 - Lubrication schedules.
   3 - Performance capacity.
   4 - Catalog data sheets.
   5 - Parts list.
   6 - Maintenance schedules.

Division 20 - General Mechanical		Code
20 05 13	Motors for Mechanical Equipment	2,4
20 05 14	Motor Control Devices for Mechanical Equipment	4
20 05 19	Meters and Gauges for Mechanical Service	4
20 05 23	General Duty Valves for Mechanical Service	1,4
20 05 93	Testing, Adjusting, and Balancing for Mechanical	

Division 21 – Fire Protection

21 13 16	Dry-Pipe Suppression System	4,5,6

Division 22 – Plumbing

22 12 00	Plumbing Specialties	4,5,6
22 33 19	Fuel-Fired Domestic Water Heaters	4,5
22 42 00	Commercial Plumbing Fixtures	4,5

Division 23- HVAC

23 34 00	HVAC Fans	1,2,4,5,6
23 37 00	Air Outlets and Inlets	4
23 54 16	Gas-Fired Duct Furnaces	1,3,4,5,6

Division 25 – Integrated Automation

25 10 00	Building Automation System	1,4,5,6
25 30 00	Field Installed Control System Components	1,4
25 90 00	Automatic Controls Sequence of Operations	

1.11 RECORD DRAWINGS

A. Provide record "as-built" drawings in accordance with Division 1 requirements. Show all deviations from Contract Drawings and location of underground lines by accurate dimensions from building lines. Show depth of all stub outs and underground lines. Dimension all concealed piping from column grids or building lines. Transfer all information to reproducible transparencies as required at the completion of the project.

1.12 DEMONSTRATION

A. General: After installation is complete, demonstrate to Engineer and Owner's Authorized Representative satisfaction as being complete and operational and entirely in conformance with Contract Documents.

B. Preparation: Prior to demonstration:
1. Submit check-off list indicating completeness of submittals and certificates of compliance for review to Owner's Authorized Representative.
2. Operate completed system for one week.
3. Verify that control verification is complete and verification report has been approved by Architect/Engineer.

C. Arrange for demonstration with Owner, Engineer, required factory technicians, and installer at least one week in advance of demonstration.

1.13 TRAINING

A. Instruct Owner in proper operation and maintenance of equipment and systems. Instruction shall generally include topics listed in manufacturer's operations and maintenance manual. Operator instructions shall cover all aspects of manual, automatic, and safety controls. Contractor shall also instruct the Owner in the general configuration of systems and location of equipment and components.

B. Furnish competent qualified technicians knowledgeable in the specific building systems and equipment provided for this project for a minimum of 4-hours on-site to instruct Owner

in operation and maintenance of systems and equipment. This figure does not include additional training noted under individual specification sections. Contractor shall keep a log of this instruction including date, times, subjects, and those present and shall present such log when requested by Engineer. Contractor shall coordinate training with Owner's Project Manager and provide a schedule for training minimum two-weeks prior to Substantial Completion. All training shall be complete 30-days after Substantial Completion.

C. Contractor shall furnish training by equipment manufacturers in addition to training described in this section where specifically listed in other sections. Contractor shall schedule training with Owner's Project Manager minimum 48-hours prior to training session. Equipment shall be fully operational prior to scheduling training session. Manufacturer's field start-up, adjustment, and service will not fulfill manufacturer's training requirement.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MATERIALS

A. All materials employed in permanent construction shall be new, full weight, in first class condition, and suitable for space provided. All similar materials shall be of one manufacturer.

B. Scheduled equipment was used as the basis of design. If Contractor chooses to use equipment that is not the basis of design, Contractor is responsible for all re-design and construction costs associated with variations in arrangement, dimension, or capacity. Such work may include, but is not limited to, changes to facility structure or dimensions and revisions to associated mechanical and electrical systems needed to provide equal system performance and maintainability.

2.02 ELECTRICAL EQUIPMENT

A. Electrical Disconnect Switch: Electrical disconnect switches specified for mechanical equipment shall conform to OSHA Lock-out/Tag-out requirements.

B. All electrical equipment shall be UL listed.

2.03 MECHANICAL SYSTEMS FIRESTOPPING

A. Acceptable Manufacturers: 3M, Hilti, Tremco, Nelson Firestop Products.

B. Provide firestopping for the following:
1. Penetrations through fire resistance rated floors, walls and partitions including openings containing pipes, ducts and other penetrating items.
2. Penetrations through non-fire resistance rated floors where the vertical service riser penetrates three or more floors.

C. Firestop system shall be UL Classified for the application and correspond to those indicated by reference to designation listed by UL Fire Resistance Directory.

D. Material shall be tested in accordance to UL-1479, ASTM E-814 for the specific fire-rated construction conditions confirming to construction assembly type, penetration item type, annular space requirements, and fire-rating involved.

2.04 SPECIAL TOOLS AND LUBRICANTS

A. Furnish and turn over to Owner, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.

B. Grease Guns with Attachments for Applicable Fittings: Provide one for each type of grease required for motor or other equipment.

C. Lubricants: Provide a minimum of one quart of oil, and one pound of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application.

PART 3 - EXECUTION

3.01 ACCESS TO EQUIPMENT AND ACCESSORIES

A. Install equipment with sufficient access for service. Where not conveniently accessible by other means, provide adequately sized access doors for valves, dampers, motors, belts, and all other mechanical equipment requiring access for removal or maintenance. Type, size and exact location of access doors shall be coordinated with Architect prior to work.

B. Provide clearances for maintenance access as indicated on drawings or as recommended by manufacturer. If access requirements shown on drawings conflict with manufacturer's recommendations, provide larger clearance of the two.

C. If equipment location shown on drawings does not allow required access, notify Architect/ Engineer prior to start of work.

D. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to Architect/Engineer for resolution prior to starting work.

3.02 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

A. Coordinate location of piping, sleeves, inserts, hangers, ductwork and equipment. Locate piping, sleeves, inserts, hangers, ductwork and equipment clear of windows, doors, openings, lights, electrical outlets, and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.

B. Operating Personnel Access and Observation Provisions: Select and arrange all equipment and systems to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices including, but not limited to: all equipment items, valves, filters, strainers, transmitters, sensors, control devices. All gauges and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Do not reduce or change maintenance and operating space and access provisions that are shown on the drawings.

C. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.

D. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.

E. Minor Piping: Small diameter pipe runs from drips and drains, water cooling, and similar minor services are generally not shown but must be provided. Contractor is responsible to

provide all such minor piping where needed to maintain mechanical spaces clean and dry and to allow full equipment function and maintenance.

F. Interconnection of Controls and Instruments: Generally not shown but must be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, instruments and computer workstations. Comply with NFPA-70.

G. Work in Existing Building: Cut required openings through existing masonry and reinforced concrete using diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the Owner's Authorized Representative. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the Architect/Engineer for determination of proper design for openings through structural sections and obtain layout approval prior to cutting or drilling into structure. After Architect/Engineer's approval, carefully cut opening through construction no larger than absolutely necessary for the required installation.

H. Switchgear Drip Protection: Do not install piping above electrical switchgear.

I. Inaccessible Equipment:
1. Where the Owner's Authorized Representative determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3.03 MECHANICAL SYSTEMS FIRESTOPPING

A. Install firestopping in accordance with manufacturer's recommendations and conditions of product UL listing.

B. Do not cover firestop installations until the examined by the Authority Having Jurisdiction, if required.

3.04 EXISTING EQUIPMENT REUSED OR RELOCATED

A. All equipment designated as existing or furnished by Owner shall be cleaned and repaired before reinstallation. Any items requiring repair shall be brought to the attention of the Construction Manager before the item is reinstalled. Damage not brought to the attention of the Construction Manager shall be deemed the result of reinstallation of the item and shall be repaired without expense to the Owner.

3.05 CLEANING SYSTEMS

A. General: After all equipment, pipes and duct systems are installed, system shall be thoroughly cleaned. Remove all stickers and tags from equipment or fixtures. Clean all piping systems prior to installation of insulation or painting.

B. Air Distribution Duct System:
1. Remove all debris from system before operation. Under no circumstances shall system be operated without filters. Replace filters used during construction with new filters.
2. Repair or replace any discolorations or damage to system, building finish, or furnishings resulting from Contractor's failure to properly clean system.

3.06 START UP

A. The Mechanical Contractor shall be responsible for proper operation of all systems and shall coordinate startup procedures, calibration and system checkout. System operational problems shall be diagnosed and corrected as required for system operation prior to Substantial Completion inspection.

B. Start equipment in accordance with manufacturer's recommendation and under manufacturer's supervision where required. Ensure that associated filters, strainers, electrical overloads, and other devices intended to protect the equipment are installed and functional prior to startup.

C. Verify that piping has been flushed and cleaned prior to startup.

3.07 LUBRICATION

A. Lubricate all devices requiring lubrication prior to initial operation. Field check all devices for proper lubrication.

B. Equip all devices with required lubrication fittings or devices.

C. All lubrication points shall be accessible without disassembling equipment, except to remove access panels.

END OF SECTION

MOTORS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide motors including bases, enclosure and mounts as specified herein and shown on drawings.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers: G.E., U.S. Motors, Baldor.

2.02 SINGLE PHASE MOTORS

A. Description: Squirrel cage induction, ball bearings, split phase, general purpose motor.

B. Quality Control: NEMA Standards, IEEE Standards, UL labeled.

C. Construction: Drip-proof construction, quiet, all-angle sleeve bearings and ball bearings, enamel finish.

D. Service Factor: Minimum 1.15 at 40 degrees C ambient temperature.

E. Overload Protection: Internal thermal overload protection.

F. Service
1. 120 volt, single phase, 60 cycle.
2. Continuous operation.
3. 1750 RPM or as scheduled.
4. Installation: Fans.

2.03 POLYPHASE MOTORS

A. Description: Horizontal, squirrel cage induction, ball bearing motors.

B. General:
1. Stator core assembly and insulation: Stacked lamination. Non-hygroscopic for Class "B." Class B temperature limits at 40 degrees C ambient. If anticipated ambient temperature at motor location exceeds 40 degrees C, upgrade insulation class accordingly.
2. Rotor and shaft assembly: Carbon steel shaft. Assembly dynamically balanced.
3. Bearing and lubrication: Ball bearings single row. Grease inlet and outlet fittings for "in-service" re-greasing while equipment is rotating. Internal shaft flinger.
4. Bearing Protection Ring: For motors controlled by variable frequency drives, provide maintenance free, conductive micro fiber, shaft grounding ring with a minimum of two rows of circumferential micro fibers to discharge electrical shaft currents within the motor and/or its bearings (AEGIS SGR or approved equal).
5. Conduit box and leads: Diagonal split with gasket. 90 degree steps. Stranded wire leads, insulated, permanently identified.
6. Service Factor: 1.15 at 40 degrees C ambient temperature for 60 cycle NEMA design B.
7. Nameplate: Embossed stainless steel fastened to frame with pins.
8. Finish: Factory applied primer and enamel.
9. Conduit box: Provided with knockouts.
10. Support: Adequate supports for installation and adjustment.

C. Open Drip-proof Enclosure:
1. Frame: Aluminum-steel.
2. Ventilation: Double end ventilated. Air in both ends and discharge out through frame.

D. Totally Enclosed Fan Cooled Enclosure:
1. Frame: Corrosion resistant cast iron.
2. End Brackets: Corrosion resistant cast-iron with machined bearing fits.
3. Ventilation: Exterior fan, mounted to motor shaft on non-load side of motor. Sized to diameter of motor and heat sinks. Integral clutch to provide adequate fan rotation for fan cooling. Ventilated safety cover over fan.
4. Heat Sinks: 0.5-inch height by 0.05-inch thickness by motor length spaced 2 inches longitudinally at a minimum, and as required by NEMA. Additional surface area as required if motor is installed where ambient temperature exceeds 40 degrees C.

E. Service: Nameplate rated as follows:
1. Continuous duty service.
2. Inverter service for motors used with variable speed drives. Constant load applications shall have 4:1 speed ratio. Variable torque applications shall have 10:1 speed ratio. Motors shall be Inverter Duty rated in accordance with NEMA MG-1 standards.
3. Nameplate voltage shall be less than or equal to scheduled voltage but not less than 95.8% of voltage rating of electrical system serving motor.
4. 1750 rpm or as scheduled.

F. Enclosure: Provide open drip proof enclosure, except provide totally enclosed fan cooled enclosure for the applications listed below, or as expressly specified elsewhere, or as indicated on drawings.
1. Outdoor applications including roof exhaust fans, cooling towers, and similar equipment.
2. Fan motors mounted in an unfiltered air stream.
3. Motors on equipment related to life safety including fire pumps and similar equipment.
4. Motors 10 HP and larger.

G. Efficiency:
1. Test Method: IEEE Method B at full load.
2. Motor Efficiency: Motor efficiency shall confirm to NEMA MG-1 Standards for Premium Efficiency Motor.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturers recommendations.

B. Coordinate connections with Division 23. Electrical connection by Division 26.

C. Size: 1/2 HP and larger, polyphase.

D. For motors used in inverter service, ensure distance from motor to inverter does not exceed manufacturer recommended maximum.

3.02 INSPECTION

A. Verify motor mounts are compatible with motor frame.

END OF SECTION

MOTOR CONTROL DEVICES FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Manual Motor Starters

1.02 DESIGN REQUIREMENTS

A. Provide motor protection switches of the appropriate NEMA size. For units not using NEMA rating, use equivalent NEMA size.

B. Provide motor protection switches in the proper enclosure as required by NEC for the location installed unless more stringent requirements otherwise noted on the Drawings or herein. Provide secondary enclosures where primary enclosures do not conform to NEC requirements.

1.03 SUBMITTALS

A. Where a thermostatically controlled enclosure is required, provide complete submittal on cabinet and drive assembly showing all enclosure characteristics. Provide full load amperage, minimum circuit ampacity, and over-current protection ratings for entire drive/enclosure assembly.

PART 2 - PRODUCTS

2.01 MANUAL MOTOR CONTROLLER, SINGLE PHASE

A. Acceptable Manufacturer: Square D.

B. General: Manual toggle switch with handle guard and lockoff, thermal overload relay, red pilot indicator light, NEMA 1 surface mounted enclosure. Square D, Class 2510 or equal.

2.02 COMBINATION MOTOR STARTER, THREE PHASE

A. Provide molded case magnetic-only circuit breakers with rotary operating handle and lock-off facility.

B. Restrict opening of switch enclosure by the use of a defeater screw unless switch is in the OFF position.

C. Provide contactors with two overload relays.

D. 120 volt holding coil.

E. Provide pilot light in cover, green LED type.

F. Provide reset button, and Hand-Off-Automatic switch in cover, field convertible to Off/Auto or Start/Stop momentary pushbutton.

G. Provide starters with three auxiliary contacts (N.O. and N.C.) to afford the control and interlocking required in addition to standard auxiliary holding contacts supplied with each contactor.

H. Provide control transformer with 120 volt secondary voltage of sufficient capacity to handle operating coil and associated controls. Protect transformers with fuses on primary and secondary sides of transformers as required by Code.

I. Minimum size NEMA 1.

J. Enclosure for dry, indoor locations: NEMA 1. Others as required by location.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install devices in accordance with manufacturer's recommendations.

3.02 COMBINATION MOTOR PROTECTION SWITCH INSTALLATION

A. In finished areas, mount motor protection switches flush and install suitable coverplates.

B. Install heaters correlated with full load current of motors provided.

C. Set overload devices according to measured current of motors provided.

END OF SECTION

METERS AND GAUGES FOR MECHANICAL SERVICE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Bimetal Thermometers.

1.02 DELIVERY, STORAGE, AND HANDLING

A. Store in manufacturer's original shipping packaging to prevent damage from water or other deteriorating elements.

B. Handle to prevent shock and loss of calibration.

1.03 PROJECT CONDITIONS

A. Environmental Requirements.
   1. Temperature: Ambient 0^{o}F to 120^{o}F.
   2. Moisture: Occasional water spray during cleaning.

PART 2 - PRODUCTS

2.01 BIMETAL THERMOMETER (Well-type)

A. Ashcroft, Marsh, Palmer, Taylor, Trerice, Weiss.

B. Materials:
   1. Dial: 5-inch diameter.
   2. Case: 300 series stainless steel, hermetically sealed.
   3. Stem: 300 stainless steel, 1/4 inch diameter. Stem length as required for application.
   4. Window: Double strength glass or plastic.
   5. Actuation: Bimetallic, silicone dampened.
   6. Dialface: Aluminum, white background with black graduations.
   7. Accuracy: +/- 1.0% Full Scale. ASME B40.3 Grade A
   8. Scale: Select the proper scale range so that the operating temperature of the material being measured will be approximately in the middle of the scale. 100^{o}F range, or as required to span entire normal operating range whichever is greater.
   9. Socket: Provide socket material suitable for fluid measured.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all devices in accordance with manufacturer’s recommendations.

B. Install gages, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining devices. Locate and position thermometers and gages to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

C. Check gauge calibration prior to installation.

3.02 TEMPERATURE GAUGES

A. Install where shown on drawings. Accessible for reading. Locations more than 6'-6" above floor require angle of 30 degrees above horizontal for easy reading.

B. Sequence of Work: Ensure thermometer sockets are installed in proper locations before water system is filled with water and leak tested.

3.03 ADJUST

A. Calibrate meters and gauges and check operation as recommended by manufacturer.

B. Adjust faces of meters and gauges to proper angle for best visibility.

END OF SECTION

GENERAL DUTY VALVES FOR MECHANICAL SERVICE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Swing Check valves.

B. Ball valves.

PART 2 - PRODUCTS

2.01 SWING CHECK VALVES

A. Acceptable Manufacturers: Hammond, Jenkins, Kennedy, Milwaukee, Nibco, or Victaulic.

B. Horizontal Swing Check 2-inch and Smaller: Swing-type, bronze body ASTM B62, rated for 125 psi saturated steam, 200 psi WOG, bronze disc, threaded or solder connections to match fittings specified for associated piping. Regrinding disc. MSS SP-80.

C. Horizontal Swing Check 2-1/2-inch and Larger: Swing-type, cast iron body ASTM Al26 Class B, rated for l25 psi saturated steam, 200 psi WOG, bronze or bronze-faced disc and seat, l25 psi ASME flanged or grooved ends to match fittings specified for associated piping, bolted cover, renewable disc and seat. MSS-SP-71.

2.02 BALL VALVES (WATER SERVICE)

A. Acceptable Manufacturers: Hammond, Milwaukee, or Nibco.

B. 2-inch and smaller: Brass body, chrome-plated or stainless steel ball, Teflon seals, full port, 400 psig working pressure rating. Screwed or solder connections to match fittings specified for associated piping. Provide stem extension to allow operation without interfering with pipe insulation.

2.03 BALL VALVES (NATURAL GAS OR PROPANE GAS SERVICE)

A. Acceptable Manufacturers: Apollo or approved equal.

B. UL listed, AGA approved for natural gas shutoff service. Full port, two-piece, cast bronze body. Teflon seals, removable handle, 600 psig WOG rated. Similar to Apollo Series 80.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install valves and accessories in accordance with manufacturer's instructions.

B. Locate valves as shown on drawings and at the following locations:
1. Where piping enters the building.
2. At branch connections to piping risers at each floor.
3. As required to individually isolate all equipment
4. To individually isolate building systems by section
5. As recommended by equipment manufacturers installation instructions.

6. To maintain proper flow and function of systems.

C. Check Valves: Install swing check valves where flow is horizontal or upward. Check valve installation where flow is downward not allowed.

3.02 APPLICATION

A. Drain Valves:
1. Where drain valves are required, provide 3/4" ball valve with hose end connections.

3.03 ADJUSTMENT

A. Check and adjust valves and accessories for smooth operation.

END OF SECTION

PIPE HANGERS, SUPPORTS, SLEEVES, AND SEALS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Pipe Hangers and Accessories.

B. Wall Supports.

C. Insulation Shields.

D. Flashing, Sleeves, and Escutcheons.

E. Waterproof Wall Seals.

1.02 RELATED SECTIONS

A. SECTION 20 05 45 – VIBRATION CONTROL FOR MECHANICAL SYSTEMS

1.03 SUBMITTALS

A. Submit shop drawings, load ratings, approved calculations and attachments required for alternative seismic assemblies. Provide registered structural engineer's stamp where required by regulatory authority.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND ACCESSORIES

A. Acceptable Manufacturer: ITT Grinnell, Gustin-Bacon, Michigan Hanger Co., Super Strut.

B. General: Furnish standard hangers and supports complete with necessary inserts, bolts, nuts, rods, washers, and other accessories.

C. Materials: Wrought steel, stainless steel, or wrought steel with copper plating. Match hangers and supports to piping material to prevent contact between dissimilar metals. Rubber or vinyl coating in place of stainless steel or copper plating acceptable on low temperature piping.

D. Adjustable Ring Hanger: For suspension of stationary piping. Comply with FS WW-H-171E (Type 7). Similar to ITT Grinnell Fig. 269.

E. Adjustable Clevis Hanger: For suspension of stationary piping. Comply with FS WW-H-171E (Type 1). Similar to ITT Grinnell Fig. 260.

F. Adjustable Steel Yoke Pipe Roll Hanger: For suspension of pipe where horizontal movement may occur. Comply with FS WW-H-171E (Type 43). Similar to ITT Grinnell Fig. 186.

G. Universal Trapeze: For suspension of multiple pipe runs. Similar to ITT Grinnell Fig. 46.

H. Riser Clamp: For support of pipe risers. Comply with FSWW-H-171E (Type 8). Similar to ITT Grinnell, Fig. 261, Fig. 261c, or Fig.CT- 121.

I. Hanger Rods: Machine threaded. Threaded both ends or continuously. Carbon steel similar to Grinnell Fig. 140 or Fig. 146

J. Concrete Inserts: For support from new concrete slab, comply with FS WW-H-171E (Type 19). Similar to ITT Grinnell Fig. 285. For existing concrete slab, use steel shell and expander plug similar to Phillips "Red Head" concrete fastener.

2.02 WALL SUPPORTS

A. Acceptable Manufacturers: ITT Grinnell, Gustin-Bacon, Michigan Hanger Co., Super Strut.

B. Wall Supports: Welded steel bracket for piping support. Comply with FS WW-H-171E (Type 32, 33, or 34). Similar to ITT Grinnell Fig.194, Fig. 195, or Fig. 199).

2.03 INSULATION SHIELDS

A. Acceptable Manufacturers: Pipe Shields, Inc., Insulshield, Uni-Grip.

B. Thermal Hanger Shields: Hydrous calcium silicate, high density, waterproof insulation, encased with 360^{o} steel jacket for pipe support. Same diameter as adjoining pipe insulation. Insulation insert to extend 1-inch each side of steel jacket for chilled water, potable cold water, and refrigerant piping.

C. Pipe Covering Protection Saddle: Curved carbon steel plate. Similar to ITT Grinnell, Fig. 160 through Fig. 165.

2.04 FLASHING, SLEEVES, AND ESCUTCHEONS

A. Flashing: 26 gauge galvanized steel or 4 lb/square foot lead sheet.

B. Sleeves: Schedule 40 steel pipe.

C. Escutcheons: Chrome plated brass or chrome plated steel. One piece type with set screw for fastening to pipe or sleeve. Not less than 3/32-inch thick for floor escutcheons. Not less than .025-inch thick for piping 3-inch and under. Not less than .035-inch for piping 4-inch and larger.

2.05 MECHANICAL SEAL

A. Acceptable Manufacturer: Thunderline Link-Seal or approved.

B. Description: Modular mechanical type, interlocking synthetic rubber links, sized to fill annulus between pipe and wall opening. Zinc coated bolts.

2.06 SEISMIC BRACING

A. Structural support members, fasteners, and attachments in accordance with SMACNA Seismic Restraint Manual. Alternative assemblies may be used, as approved by Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all equipment in accordance with manufacturer’s recommendation.

B. Install piping so that no forces from piping system exist at equipment connection.

C. Prime coat all steel hangers and supports prior to installation.

3.02 HORIZONTAL AND VERTICAL PIPE HANGERS AND ACCESSORIES

A. Horizontal Hanger Schedule.

1. Chilled Water, Condenser Water, and Potable Cold Water Piping:

Nominal Pipe Size	Hanger Type
1/2" - 1-1/2"	Adjustable Ring
2" and above	Adjustable Clevis

2. Heating Water, Domestic Hot Water, Domestic Hot Water Recirculation and Condensate Return Piping:

1/2" - 2"	Adjustable Clevis
2-1/2" and above	Adjustable Steel Yoke Pipe Roll

3. Steam Piping:

1/2" - 1-1/2"	Adjustable Clevis
2" and above	Adjustable Steel Yoke Pipe Roll

4. Refrigerant Piping:

1/2" - 1-1/2"	Adjustable Ring
2" and above	Adjustable Clevis

5. Drain Piping:

All sizes	Adjustable Ring

6. Cast-iron Waste and Vent Piping:

1-1/2”-3”	Adjustable Ring
4” and above	Adjustable Clevis

B. Trapeze Hangers: Use for support of multiple piping runs. Size to carry maximum piping load according to manufacturer’s recommendations.

C. Riser Clamps: Support riser piping independent of horizontal piping. Provide riser clamp at each floor. Preferably locate clamp immediately below coupling on steel or copper pipe or hub on cast-iron pipe.

D. Spacing: Support horizontal piping as follows:

Pipe	Sizes	Spacing	Hanger Rod
Carbon Steel	1/2"	5'-0"	3/8"
And Stainless	3/4, thru 1-1/4"	6'-0"	3/8"
Steel Pipe	1-1/2", thru 2"	10'-0"	1/2"
	2-1/2", thru 3"	12'-0"	1/2"
	3-1/2" thru 6"	12'-0"	5/8"
	6" thru 18"	12'-0"	3/4"

Copper Tubing and Piping	less than 1"	5'-0"	3/8"
	1-1/4" thru 2"	8'-0"	3/8"
	2-1/2" thru 5"	10'-0"	1/2"
Plastic Piping	1/2" - 3/4"	2'-6"	3/8"
	1"	3'-0"	3/8"
	1-1/4" - 2"	4'-6"	3/8"
	3"	5'-0"	1/2"
	4" - 8"	6'-0"	5/8"
	10" - 15"	8'-0"	3/4"

E. Locate hangers as close as possible to concentrated loads such as valves and loadings imposed by branch connections.

F. Locate hangers as near as possible to horizontal changes in direction. If this is not feasible, spans around corners should be reduced 25%.

G. First hanger off of the equipment not to exceed 50% of allowable piping span from equipment connection.

H. For support from new concrete slab, provide concrete insert. Provide reinforcement rod in concrete for inserts carrying pipe over 4-inches. For support from existing concrete slab, use expanding concrete fastener. Inspect existing structure to ensure structure will support required load.

I. Testing and Inspection:
1. Arrange for periodic special inspection for expanding concrete fasteners as required by Chapter 17 of the Oregon Structural Specialty Code. Inspections will be performed by independent agency in accordance with 01 40 00 – QUALITY REQUIREMENTS.
2. Conform with American Concrete Institute 318: 3.8.6, 8.1.3, 21.2.8.

3.03 WALL SUPPORTS

A. Select support according to manufacturer's recommendations to carry maximum piping load.

B. Support piping as required for horizontal and vertical pipe hangers and supports.

3.04 INSULATION SHIELDS

A. General: Provide insulation shield on insulated piping at all hangers and supports.

B. Thermal Hanger Shield:
1. Provide for all roller type hangers and supports. Install according to manufacturer's recommendation.
2. Butt joint between pipe insulation and shield. Seal with vapor barrier lap cement at joint and 3-inch wide vapor barrier type tape.

C. Pipe Covering Protection Saddle:
1. Provide for all non-roller type hangers and supports.
2. Install according to manufacturer's recommendations.

D. Sequence of Work:
1. Install when hanging pipe to allow hanger length and support height to be adjusted properly for even piping load.

3.05 FLASHING, SLEEVES, AND ESCUTCHEONS

A. Flashing:
1. Flash and counterflash with 26 gauge galvanized steel where piping passes through roofing.
2. Flash vent and soil pipe with lead sheet. Extend flashing not less than 8-inches each way from piping penetration. Counterflash vents with counterflashing turned into pipe end or adapted to vent caps as required.

B. Sleeves:
1. General: Install at all concrete or masonry walls or floors.
2. Core drill hole in existing concrete or masonry for sleeve installation. Cast in place for new work.
3. Terminate sleeves flush with walls, partitions, or ceilings. Terminate sleeves 2-inches above floor level at floor penetrations.
4. X Fasten sleeves securely to structure. Take precautions to prevent debris from entering annulus between pipe and sleeve during construction.
5. For interior non-waterproof wall penetrations, seal annulus with Dow-Corning 3-6548 silicone RTV foam or equal.
6. For exterior wall or floor penetrations, provide mechanical waterproof wall seal.

C. Escutcheons: Install escutcheons at all wall, ceiling, or floor pipe penetrations to finished areas.

3.06 MECHANICAL SEAL

A. Provide for each exterior wall or floor penetration.

B. Install and tighten seal as recommended by manufacturer.

END OF SECTION

VIBRATION ISOLATION FOR MECHANICAL SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Vibration isolation for mechanical equipment, piping, and ductwork systems.

1.02 DESIGN REQUIREMENTS

A. A minimum of four vibration isolators shall be provided to support equipment.

B. Vibration isolator selection shall account for equipment weight distribution to produce reasonably uniform deflection at each isolator.

PART 2 – PRODUCTS

2.01 HANGERS

A. Acceptable Manufacturers: Mason, Kinetics, Amber Booth.

B. Spring and Neoprene Hangers (SH-1):
1. Steel spring and 0.3-inch deflection neoprene element in series.
2. Spring in neoprene cup or ¼ inch neoprene acoustical friction pads between spring and support.
3. Neoprene element molded with rod isolation bushing that passes through hanger box
4. Steel spring located in neoprene cup with grommet to prevent short circuiting of hanger rod.
5. Spring diameters and hanger box lower hole sizes large enough to permit hanger rod swing of 30 degree arc before contacting hole and short circuiting spring.
6. Springs minimum additional travel to solid equal to 50 percent of rated deflection.
7. Similar to Mason Industries, Inc. 30N.

PART 3 – EXECUTION

3.01 COORDINATION

A. Coordinate with other trades and plan work to ensure that adequate clearances are maintained to allow vibration isolation equipment and materials to be installed while maintaining appropriate access for maintenance and equipment operation.

3.02 INSTALLATION

A. Install individual vibration isolation components in accordance with manufactured recommendations.

B. Attachment to Structure: Where shown on drawings, attach as detailed. Otherwise, for support from new concrete slab, comply with FS WW-H-171E (Type 19). Similar to ITT Grinnell Fig. 285. For existing concrete slab, use steel shell and expander plug similar to Phillips "Red Head" concrete fastener.

C. Installation of vibration isolators shall not cause any change in position of equipment, piping, or ductwork resulting in stresses or misalignment.

D. Arrange so there is no rigid connection between equipment, piping, or ductwork and the building structure for all systems and equipment requiring vibration isolation.

E. Adjust isolators to equalize load within 10 percent.

F. Flexible Connectors: Flexible connector shall be installed with no misalignment of piping and equipment connections.

3.03 APPLICATION

A. Equipment: Provide isolation as scheduled below

EQUIPMENT DESIGNATION	VIBRATION ISOLATION	
	Isolator, restraint, flexible connector designation	Minimum Static Deflection
Suspended Horizontal Cabinet Fan	SH-1	1”
Suspended Exhaust Fan	SH-1	1”

B. Ductwork:

1. Horizontal Ductwork: Provide vibration isolators on first three duct hangers from mechanical equipment connections for ductwork with a cross sectional area of 1 square foot and larger. Minimum 0.75 inch deflection.

END OF SECTION

SEISMIC CONTROL FOR MECHANICAL SYSTEMS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Design and installation of seismic restraint of new mechanical equipment, piping, and ductwork installed hereunder.

1.02 DEFINITIONS AND ABBREVIATIONS

A. Custom Engineered Assembly: Anchorage and seismic restraint assembly comprised of standard or proprietary components, designed and applied to system by the seismic restraint system Engineer.

B. Pre-Engineered Assembly: Previously designed anchorage and seismic restraint assembly selected and applied to system by the seismic restraint system Engineer.

C. Equipment:
   1. Includes (but not limited to) suspended units, flues, etc. Equipment referred to by type is typical. Equipment not specifically listed here is still subject to the requirements listed herein.
   2. Weight: Installed operating weight of equipment as reported by equipment manufacturer.

1.03 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: Per code for site address.

C. Seismic restraint design calculations shall consider localized effects on structural elements induced by the connection loads.

1.04 SYSTEM ENGINEERING AND QUALITY ASSURANCE

A. Seismic restraint system shall be engineered to comply with criteria stated and referenced herein.

B. System engineering shall be performed by a Structural Engineer currently licensed to practice in the State of Oregon.

C. System engineering shall include design and application of Custom Engineered and/or Pre-Engineered Assemblies, as applicable to this project.

D. Approved System Engineering Services: Mason Industries, Amber-Booth, Kinetics, Vibro-Acoustics, or an independent structural engineer.

1.05 SUBMITTALS

A. Submittals are required for all equipment anchors, supports and seismic restraints. Submittals shall include weights, dimensions, standard connections, and manufacturer's certification that all specified equipment will withstand seismic forces.
   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. Drawings shall consist of mechanically reproduced copies of the Contract Documents, or custom drafted specifically for the Work of this Project. 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 assumed design conditions and maximum load capacity of assembly, certified by a Registered Professional Engineer.
      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.

B. The entire submittal package comprised of drawings, details, and calculation shall be stamped and signed by the seismic restraint system Engineer.

C. At completion of seismic restraint system installation, 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 or the designated representative.

PART 2 - PRODUCTS

2.01 PRE-ENGINEERED ASSEMBLIES

A. Acceptable Manufacturers: Mason Industries, Amber-Booth, Kinetics, Tolco, B-Line, Vibro-Acoustics, or approved.

B. Anchorage and seismic restraint assembly comprised of standard or proprietary components, capable of application to restraint system and supporting structure.

C. Assemblies may be selected from SMACNA Seismic Restraint Manual or as engineered by an approved proprietary manufacturer.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate the design of seismic restraint systems with contract documents indicating a specific seismic design approach and load capabilities of the existing building structure.

B. Coordinate the design of seismic restraint systems with the equipment and piping support

structure provided hereunder.

C. Where information presented in the contract documents is not adequate to allow design of seismic restraint, provide a request for information including a listing of specific information required.

D. Notify the engineer when the existing building support structure or new equipment and piping support structure is not adequate to provide seismic restraint.

E. Coordinate the seismic restraint design with new equipment to ensure manufacturer's recommended maintenance clearances are maintained.

3.02 INSTALLATION

A. Install seismic restraint system in strict accordance with the manufacturer's written instructions and certified submittal data.

B. Maintain all existing walkways and service routes clear of seismic restraint cables and other restraint equipment.

C. Attach restraints and anchors to a common structural element plane and within a common structural system.

D. For non-isolated suspended equipment and piping, install solid braces or taut flexible cable restraints.

E. Provide supplementary support steel for equipment, piping, and ductwork required for the Work of this Section.

F. Equipment Seismic Restraint
1. Coordinate size of new structural support pad and/or concrete piers to ensure adequate space for required bases, isolators, restraints, and attachment thereto.

G. Piping Seismic Restraint
1. Provide minimum of two transverse supports and one longitudinal support on each pipe 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 is shorter than the minimum interval between braces, provide braces at each end.
2. Where restraints are attached to clevis style pipe hangers, the cross bolt must be reinforced.

END OF SECTION

IDENTIFICATION FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Piping Identification

B. Valve Identification

C. Equipment Identification

1.02 REFERENCE STANDARDS

A. ANSI A 13.1, Scheme for the Identification of Piping Systems

PART 2 - PRODUCTS

2.01 PIPING IDENTIFICATION

A. Acceptable Manufacturer: Seton, Brady, MSI

B. Label Description:
1. Semi-rigid plastic snap-around type with printed piping identification on colored background
2. Letter size: Conform to ANSI A 13.1
3. Letter and background color: Conform to ANSI A 13.1
4. Direction arrow on each label indicating direction of flow
5. Legend Wording: Match piping description shown on Symbols list

2.02 VALVE IDENTIFICATION

A. Acceptable Manufacturer: Seton, Brady, MSI

B. Valves identified by distinguishing numbers and letters as shown on valve chart.

C. Valve Tag:
1. Material: Polished brass or aluminum.
2. Identification: 1/4-inch high letters, 1/2-inch high numbers. Black filled.
3. 1-1/2 inch diameter.
4. Attachment: Smooth ply brass wire, brass "S" hook, or brass chain.
5. Legend Wording: Match piping abbreviation shown on Symbols list. Number valves sequentially by system type. Coordinate with existing numbering sequence where appropriate.

D. Valve Directory:
1. Valve identification number for each valve.
2. Location of each valve.
3. Exposed or concealed.
4. Purpose of each valve.
5. Valves size
6. Valve manufacturer and model number
7. Normal position of each valve.

2.03 EQUIPMENT IDENTIFICATION

A. Nameplates:
1. Aluminum: 2-1/2" x 3/4" high. Black enamel background. Etched or engraved natural aluminum lettering.
2. Plastic: Laminated black-white-black phenolic plastic. Engraved to show white lettering on black background, except for labels attached to ceiling grid or located within finished spaces shall have black lettering on white background. Gothic letters minimum 3/16-inches high.

B. Name of unit and number designation as scheduled on drawings.

PART 3 - EXECUTION

3.01 GENERAL

A. Ensure surfaces are clean, dry, and free of debris before attaching nameplates.

3.02 PIPE IDENTIFICATION

A. Provide labels for piping. Labels shall be visible from walkways and service locations and/or floor level.

B. Locations of Pipe Labels as follows:
1. On all horizontal pipe runs every 20 feet
2. At each riser
3. At each branch and riser take-off
4. At each passage through wall, floor and ceiling construction
5. Adjacent to equipment connections
6. Adjacent to each valve and fitting, except plumbing fixtures
7. At each passage to underground
8. Minimum one marker between pieces of equipment
9. Where required to easily identify the medium transported

C. Coordinate location of piping labels in occupied spaces with Architect.

3.03 VALVE IDENTIFICATION

A. Identify all valves specified in Divisions 20 through 25.

B. Valve Charts: One copy in each O&M manual and one copy framed and permanently mounted in mechanical room.

C. Continue existing numbering sequence for new valves installed in existing buildings.

3.04 EQUIPMENT IDENTIFICATION

A. All plumbing, heating, air conditioning, piping, automatic temperature control equipment (excluding thermostats and relays), and distribution systems shall be labeled. Electrical switches and starters for mechanical equipment shall also be labeled.

B. Equipment nameplates shall include the following information at a minimum:
1. Plan identification tag

2. Area or zone served
3. Capacity specified at designed operating conditions
4. Actual capacity as balanced at site operating conditions
5. All new installations of evaporator coil housing and condenser units shall have tags that state who installed the unit, a warranty contact phone number and warranty date, start to finish.

3.05 EQUIPMENT IDENTIFICATION

A. Provide labels for all scheduled equipment. Place labels in a conspicuous place. Nameplate either aluminum or plastic permanently attached to equipment. Provide identical identification plate on starter and on disconnects.

B. Provide labels for all ceiling mounted equipment located above T-bar ceiling on ceiling support frame adjacent to unit. Provide identical identification plate on space temperature, humidity, and CO_2 sensors located in finished spaces.

C. Provide labels for fire and/or smoke dampers at access points from occupied spaces. Install label on T-bar ceiling support frame adjacent to unit or at point of access. Coordinate final locations with Architect and Owner.

3.06 TEMPORARY IDENTIFICATION

A. Temporarily identify piping during installation. Paint, chalk or other similar method allowed.

END OF SECTION

TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section describes testing, adjusting, and balancing of air and water systems specified in Division 23. Work shall generally consist of volume adjustments, speed adjustments, performing tests, recording equipment data and measurements, and preparing reports.

B. Work Provided Under Separate Contract: Owner will provide testing, adjusting and balancing services. Work will be performed by a NEBB certified TAB Contractor. All work will be performed under the direct supervision of a NEBB certified Project Supervisor.

C. Contractor shall provide the following related services:
1. Incorporate balancing activities in Contractor's construction schedule.
2. Attend pre-balancing coordination meeting.
3. Provide access to the Work.
4. Incidental labor, facilities, and equipment to assist TAB Contractor in conducting work.

1.02 DEFINITIONS

A. TAB: Testing, adjusting, and balancing.

B. BAS: Building Automation System. Automatic control system consisting of standalone or integrated digital controllers used to control HVAC equipment.

C. NEBB: National Environmental Balancing Bureau.

D. Project Supervisor: Individual employed by TAB Contractor having administrative and technical responsibility for work performed under this Section.

1.03 QUALITY ASSURANCE

A. Contractor shall attend a prebalancing coordination meeting with the Owner and Engineer. Meeting agenda shall include: coordination of work between TAB Contractor and Control Contractor, balancing procedures, and sequencing and scheduling work.

1.04 SEQUENCING

A. Provide notification to Owner and TAB contractor when HVAC systems are ready for balancing. Notification of changes in scheduled start date shall be made a minimum of 24 hours in advance. If required notification is not provided, Contractor shall compensate Owner for additional costs by Contract modification.

B. Schedule adequate time in the construction schedule as determined by the Owner and TAB contractor for TAB work. TAB work will be performed during normal business hours, and be completed prior to occupancy. The Owner will be compensated for additional TAB costs caused by the Contractor's failure to provide adequate time for TAB work by Contract modification.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide all belts and sheaves for fans as required to meet scheduled fan RPM. Furnish additional belts and sheaves to balancer as required for balancer to obtain specified performance requirements.

PART 3 - EXECUTION

3.01 BAS CALIBRATION AND TESTING

A. TAB Contractor will perform tests as described below to determine the following BAS control setpoints and control parameters. BAS contractor shall provide all instruction, hardware and software necessary for the TAB contractor to perform work including but not limited to laptop computer, interconnecting cables, BAS application software, passwords, and on-site assistance of a qualified BAS technician.
   1. Outside air damper settings to achieve minimum ventilation rates under normal operating conditions.

3.02 ACCESS TO WORK

A. Contractor shall provide facilities and access for TAB Contractor to perform work including but not limited to:
   1. Keys, security passes, etc.
   2. Lifts where work is more than 12 feet above floor level.
   3. Removal of ceiling tiles, partitions, panels, or other fixed construction necessary for completion of TAB work.

END OF SECTION

DRY-PIPE SUPPRESSION SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Modifications to existing dry-pipe fire suppression system.

1.02 DESIGN REQUIREMENTS

A. The fire suppression system shall comply with the rules, regulations, and ordinances of the Authority Having Jurisdiction and the following referenced standards:
   1. NFPA 13 - Standard for Installation of Fire Sprinkler Systems

B. Design shall be performed and stamped by a Professional Engineer registered in fire protection design as required by the Authority Having Jurisdiction.

C. Hazard Classifications: As defined by NFPA 13 and by Authority Having Jurisdiction.

1.03 SYSTEM DESCRIPTION

A. Provide modification of existing wet pipe sprinkler systems to accommodate building upgrades shown on drawings and as specified. Provide all modifications required by AHJ to achieve required coverage.

1.04 QUALITY ASSURANCE

A. Contractor shall have five-years experience in design and installation of equipment and systems similar to that specified hereunder. Contractor shall have an office within 200 miles radius of job site which can provide emergency maintenance service.

B. The system designer shall be responsible for verifying site conditions, design requirements, and work being performed by other trades as related to the suppression system design. Design shall accommodate work being performed by other trades. Contractor shall identify areas of the building which will be subject to freezing.

C. Piping system shall be concealed above ceilings, except where shown on drawings or where no ceilings are being installed. Piping routing must be approved by the Architect where piping is exposed of view.

D. Sprinkler head locations must be approved by the Architect.

E. Contractor shall obtain water service test data including static pressure, residual pressure/water flow available at the project site.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer’s technical literature and installation instructions for products and materials.

B. Fabrication Drawings: Prepare scaled drawings for fire protection piping, heads, valves, and accessories including pipe sizes, locations, elevations, slope of horizontal runs, wall and floor penetrations and connections. Identify system components which are located in areas of the building which are subject to freezing.

C. Calculations: Prepare hydraulic calculations of fire protection systems. Submit copy of calculations for approval.

D. Submittal Process:
1. Submit preliminary drawings showing exposed piping and sprinkler layout to Architect for approval.
2. Upon approval by Architect, submit drawings to Authority Having Jurisdiction.
3. Upon approval by Authority Having Jurisdiction, submit final drawings with approval stamp to Architect.

E. Certificate of Installation: Submit certification upon completion of fire protection piping work confirming that the work was tested in accordance with NFPA 13, and that the system is fully complete and operational.

PART 2 - PRODUCTS

2.01 GENERAL

A. All products shall be UL listed and FM approved.

2.02 PIPE AND FITTINGS

A. Automatic Fire Sprinkler, Dry Pipe (AFS), above grade:
1. Galvanized steel. ASTM A-135, Grade B, galvanized, schedule 10 steel pipe or ASTM A53 Type E, Grade B, galvanized, schedule 40 standard weight steel pipe.
2. Weight: Schedule as required in NFPA No. 13.
3. Fittings: Threaded, malleable iron threaded, 150 lb. ANSI B16.3 or mechanical joint, ASTM 47, galvanized.

2.03 SPRINKLER HEADS

A. General:
1. UL Listed and FM approved.
2. Provide temperature rating in accordance with NFPA 13.

B. Acceptable Manufacturers: Standard, Tyco, Viking, or approved.

C. Upright:
1. Finish: Exposed, standard chrome head and escutcheon; concealed, standard brass.
2. Application: Exposed piping and concealed spaces.

D. Dry Pendent:
1. Finish: Exposed, standard chrome; concealed, standard brass.
2. Application: Exposed piping and concealed spaces.

E. Upright/Pendent Sidewall: Directional discharge designed for upright or pendent operation.
1. Finish: Standard chrome.
2. Application: Exposed piping and concealed spaces.

F. Spare Sprinklers:
1. Provide additional spare sprinkler heads of type and quantity as required by NFPA 13.

2.04 VALVES

A. Ball Valves
1. 1/4-inch to 1-inch: Full flow port, cast-bronze body. Teflon seals, removable handle ball valve. WW-V-35, Type II, Class A, 150 WSP. Ends to match connected pipe. Similar to Grinnell Fig. No. 3700.
2. 1-1/4-inch to 2-inch: Full flow port, cast-bronze body. Teflon seals, removable handle ball valve. WW-V-35, Type II, Class A, 125 WSP. Ends to match connected pipe. Similar to Grinnell Fig. No. 3500.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Drawings show approximate locations of piping mains, sprinkler zones, and types of systems. Drawings do not show the location of most heads. In general, sprinkler shall be located in the center of ceiling panels and symmetrically within rooms and down corridors, coordinate head locations with lights and grilles. Some sprinkler heads may be shown on drawings where appearance is critical.

B. Fire sprinkler guards will be provided on exposed sprinkler in areas subject to damage.

C. Install pipe parallel to building structural system and in a neat and professional manner.

D. Discharge drain piping to outside with suitable splash plate to a location approved by the Architect.

E. Provide seismic bracing as required by NFPA and Authority Having Jurisdiction. Verify Seismic Zone and classification as “Essential” or “Non-essential” with Authority Having Jurisdiction.

F. Drains from zone stations.

3.02 TESTS

A. Perform tests as required by Authority Having Jurisdiction.

B. Perform hydrostatic of all piping at 125 psi or 50 psi above system static pressure and maintain for four hours.

C. Provide duplicate test certificates and approvals by the Authority Having Jurisdiction to Architect.

3.03 RECORD DRAWINGS.

A. Provide as-built drawings in accordance with SECTION 01 78 00 – CLOSEOUT DOCUMENTS.

END OF SECTION

PLUMBING INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Piping Insulation.
   1. Glass fiber insulation
   2. PVC jacketing and fitting covers
   3. Preformed plumbing insulation

1.02 QUALITY ASSURANCE

A. Insulation materials and accessories shall be installed in a professional manner by skilled and experienced workers who specialize in commercial insulation work.

B. Products shall have flame spread and smoke developed ratings based on test procedures in accordance with NFPA-255 and UL 723. Rating shall be indicated on the produce or on the shipping containers.

C. Unless otherwise specified, products shall have flame spread rating no greater than 25 and smoke development ratings no greater than 50.

D. Specified k factors are at 100^{o}F mean temperature unless stated otherwise. Where optional insulation material is used, select thickness to provide thermal conductance no greater than that for the specified material.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Every package or standard container of insulation or accessories delivered at the job site must have a manufacturer's stamp or label giving the name of the manufacturer and description of the material.

B. All of the insulation materials and accessories shall be delivered to the job site and stored in a safe, dry place.

C. If any insulation material has become wet in transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site.

PART 2 - PRODUCTS

2.01 PIPING INSULATION

A. Glass Fiber Insulation (GF)
   1. Acceptable Manufacturers: Certainteed, John Manville, Knuaf, Owens-Corning.
   2. Type: Preformed fiberglass insulation with factory applied vapor barrier facing.
   3. Insulation: ASTM C 547 Type 1.
   4. Conductivity: Maximum 0.25 btu-in/(hr-ft^{2}-^{o}F) at 100 ^{o}F mean temperature.
   5. Jacket: ASTM C 1136
   6. Maximum Operating Temperature: Pipe surface - 800^{o}F, ambient - 150^{o}F.
   7. Basis of Design: John Mansville, Mirco-lok.

B. PVC Fitting Covers and Jacketing
   1. Acceptable Manufacturers: Certainteed, John Manville, Knuaf, Owens-Corning.

2. Jacketing: 20 mil. PVC.
3. Fitting Covers: Molded PVC snap-on type valve and fitting covers with precut or molded insulation to match adjacent piping. Provide stainless steel tack fasteners, vapor barrier mastic, and pressure sensitive tape as necessary.
4. Basis of Design: John Mansville, Zeston 2000 PVC

C. Preformed Plumbing Insulation: Preformed, fire resistant, closed cell foam insulation suitable for use on plumbing traps and hot water supply piping. Thermal resistance R-2. White vinyl, paintable, sanitary finish. Manufacturer: Brocer Products Inc., TCI Products.

D. Insulation Schedule:

Piping System	Operating Range	Type	Run-outs	Piping Mains			
			Up to 2"	Thru 1"	1.25" to 2"	2.5" to 4"	Over 4"
Domestic Cold Water	50-70	GF	0.5	0.5	0.5	0.5	0.5
Domestic Hot Water	105-180	GF	1.0	1.0	1.0	1.0	1.0

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations and as specified.

3.02 PIPING INSULATION

A. General
1. Pressure tests of joints and connections shall be completed and work approved before application of insulation.
2. Surfaces shall be clean and dry with all foreign materials, such as dirt, oil, loose scale and rust removed.
3. Except for specific exceptions, insulate entire specified piping systems including piping, fittings, valves and accessories.
4. Insulation shall be installed in accordance with manufacturer's recommendations and in a neat and professional manner. Insulation shall have smooth and even surfaces, jackets and facings drawn tight, and smoothly cemented down at all laps. Finish all exposed ends and other surfaces with insulating cement.
5. Insulation shall be continuous through all sleeves and openings, except at fire partitions and duct heaters.
6. Vapor barriers shall be continuous and uninterrupted throughout systems with operating temperature 60^{o}F and below.
7. Insulate piping individually.
8. Piping insulation jackets: Piping located across passage ways, egress paths, or otherwise exposed to physical damage shall have PVC jacket.
9. Do not insulate the following piping components:
   a. Safety relief valves, relief valves, pressure/temperature relief valves.
   b. Vent and drain piping, except where protective insulation is required to prevent physical damage.
   c. Unions
   d. Expansion devices, flexible connectors

END OF SECTION

PLUMBING PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Plumbing Piping Systems.

PART 2 - PRODUCTS

2.01 SANITARY WASTE, VENT PIPING (W, V)

A. Steel Pipe: Up to 1-1/2 inches:
1. ASTM A53, Type E, Grade B, galvanized, standard weight (Schedule 40).
2. Threaded Fittings: ANSI B16.3, malleable-iron, 150 lb. galvanized.

B. Cast Iron: 2-inches and larger:
1. Hubless Cast-Iron Pipe and Fittings: Cast-Iron Soil Pipe Institute Standard 301, service weight.
2. Sealing Sleeve: ASTM C 564, neoprene sealing sleeve for hubless cast iron pipe and fittings.
3. Shield and Clamping Assembly: Cast-Iron Soil Pipe Institute, Standard 310, stainless steel corrugated shield and clamping bands.

2.02 POTABLE WATER PIPING (CW, HW, HWR)

A. Seamless copper water tube, ASTM B 88 hard drawn:
1. Above-grade Piping: Type M.
2. Below-grade Piping: Type L

B. Fittings:
1. ANSI B16.22: Wrought copper and bronze solder joint pressure fittings.
2. ANSI B16.18: Cast bronze solder joint pressure fittings.
3. Joining: Solder up to 1-1/4 inches. Braze 1-1/2 inches and larger.

C. Solder Materials :
1. Solder Filler Alloy: ASTM B 32, 95-5 Tin-antimony (Sb5).
2. Flux: Fed. Spec. FS-0-F-506C, non-corrosive flux.

D. Brazing Materials:
1. Brazing Filler Metals: AWS A5.8, Classification BCuP-5.
2. Brazing Filler Alloys: ASTM B260-52T, Sil-Fos (15% silver, 80% copper).
3. Flux: Silver brazing flux, non-corrosive.

2.03 TRAP PRIMER

A. Pipe: Seamless copper water tube, ASTM B-88, Type M copper, soft drawn tube.

B. Fittings: No joints below grade. For pipes below grade double wrap with Scotch Wrap #51, 2’ wide with 50% overlap

PART 3 - EXECUTION

3.01 INSTALLATION

A. Piping Layout
1. Give special attention to appearance of complete installation.
2. Make provision for expansion and contraction during normal operation.
3. Run parallel to wall of building.
4. Keep free of contact with building construction or installed items.
5. Cut pipe from measurements taken at the site, not from drawings.

B. Steel Piping:
1. Threaded Joints:
   a. Cut threads full and clean with sharp dies.
   b. Ream ends of pipe after threading and before assembly to remove burrs.
   c. Leave not more than three pipe threads exposed at each connection.
   d. Use joint compound or thread tape on male thread only in making joints.
   e. Keep free of contact with building construction or installed items.

C. Copper Tubing and Pipe:
1. Brazed and Solder Joints:
   a. Ream or file pipe to remove burrs.
   b. Clean and polish contact surfaces of joint.
   c. Apply flux to both male and female ends.
   d. Insert end of tube into fittings full depth of socket.
   e. Bring joint to temperature in as short of time as possible.
   f. Form continuous bead around entire circumference of joint.

3.02 DRAINAGE

A. Where possible, arrange piping so that systems can be completely drained.

3.03 CORROSION PROTECTION

A. Wherever steel pipe is connected to copper pipe, or equipment containing copper, bronze, or cupro-nickel, use di-electric unions properly installed with no electrical path through connection. See Section 22 12 00 – PLUMBING SPECIALTIES.

3.04 CLEANING AND DISINFECTION

A. Keep inside of all pipe and fittings clean and free from dirt and debris.

B. Thoroughly blow all lines before testing or placing in service.

C. Disinfect water mains and water service piping in accordance with AWWA C 601 or as required by Authority Having Jurisdiction. Use either liquid chlorine or hypochlorite for sterilizer.

3.05 TESTING

A. Sanitary Waste and Vent Piping:
1. Water Test: Either in system entirely or in sections. Entire system, openings in piping tightly closed, except highest and system filled with water to point of overflow. If in sections, each opening tightly plugged except highest opening of section under test, and

each section filled with water. No section tested with less than ten foot head of water. Water kept in system, or in the portion under test, for at least fifteen minutes before inspection starts. System tight at all joints.

2. Air Test: Test at 5 psi. Pressure held without introduction of additional air for at least fifteen minutes.

B. Potable Water Piping:

1. Water Test: Entire system shall be tested and proven water-tight under a water pressure not less than the working pressure under which it is to be used. Clean domestic water shall be used as test medium. Piping shall withstand the test without leaking for a period of not less than 15 minutes.
2. Air Test: 50 psi air pressure may be substituted for the water test. Piping shall withstand the test without leaking for a period of not less than 15 minutes.

END OF SECTION

PLUMBING SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pressure Safety Relief Valves

B. Thermostatic Mixing Valves

C. Wye Strainers

D. Diaphragm Expansion Tanks

E. Water Hammer Arrestors

F. Di-electric Unions

G. Trap Primer Valves

PART 2 - PRODUCTS

2.01 PRESSURE SAFETY RELIEF VALVES

A. Pressure Relief: Constructed in accordance with ASME, relief setting 125 psi or as shown on drawing. Similar to Watts No. 740.

B. Temperature and Pressure Relief: Cast bronze body, non-mechanical seat-to-disc alignment, stainless steel spring, vacuum relief valve emergency safety fuse plug, vandal-resistant bonnet screws, wax-filled thermo probe with length suitable for tank tapping installation, automatic reset. Constructed in accordance with ANSI Z21.22. ASME and AGA listed. Size and capacity as recommended by equipment manufacturer and in accordance with regulatory requirements. Pressure relief setpoint 125 psi or as shown on drawings. Watts Regulator #100XL, 40XL, 1140, N240, or 340 Series or equal.

2.02 THERMOSTATIC MIXING VALVES

A. Approved Manufacturers: Powers, Watts, or approved equal.

B. Multiple Fixture: Thermostatic type water mixing valve for exposed piping application. Bronze body with non-corrosive chrome finish. Conforms to ASSE 1017. Similar to Powers Series SH1432. Lead free.
1. Inlets: Inlet stop valve, check valve, and strainer or triple duty check stop.
2. Outlet: Tempered water on-off valve, vacuum breaker, and direct reading dial thermometer.
3. Capacity: 1.0 to 19 gpm.

C. Single Fixture: Thermostatic type water mixing valve for under counter piping application. Bronze body with non-corrosive chrome finish. Conforms to ASSE 1016-1996 and 1070, down to 0.5 gpm. Similar to Powers Series LFe480.
1. Inlets: Integral checks.
2. Outlet: Adjustable temperature selection with locknut to prevent tampering.
3. Capacity: 0.5 to 4 gpm.

2.03 WYE STRAINERS

A. Description: Self-cleaning, wye type strainer. 125 psi minimum. Blowoff outlet. Free area of strainer element four times pipe area. Strainer size to match pipe size. Removable screen element. End connections to match existing connected piping system. Bronze body. Armstrong, Mueller Steam Specialty, Metraflex, Spirax Sarco, or approved.
   1. 2-Inch and Smaller: Brass wire screen, 20 mesh.
   2. 2-1/2-Inch to 4-Inch: Brass screen, .037 inch (1/16-inch) diameter perforations.
   3. 5-Inch and Larger: Brass screen, 1/8-inch diameter perforations.

2.04 DIAPHRAGM EXPANSION TANKS

A. General: Precharged, vertical steel, butyl diaphragm, butyl or polypropylene dome liner, bronze or stainless steel connector, ring base, charging valve, and lifting rings. FDA approved. ASME Code rate to 125 psi. Amtrol, Bell & Gossett, Watts, or approved.

B. Capacity: As scheduled on drawings.

2.05 WATER HAMMER ARRESTORS

A. Water Hammer Arrestors:
   1. Type: Factory pressurized and sealed, with stainless steel bellows or brass piston.
   2. Testing and Fixture Unit Ratings: In accordance with Plumbing and Drainage Institute (PDI) standard WH-201.
   3. Manufacturer: Similar to Jay R. Smith “Hydrotrol” or PPP “SC” series, or equal by Jonespec, Josam, Wade, Watts, Zurn, or approved.

2.06 DI-ELECTRIC UNIONS

A. Di-electric Unions:
   1. Threaded Unions: ANSI B 16.39, maximum working pressure 250 psi. Galvanized steel body and nut, nylon insulator, brass tailpiece. Similar to Wilkins Model DU, DUC or DUM.
   2. Flanged Unions: ANSI B16.42 or B 16.24, maximum working pressure 175 psi. Galvanized steel body. Similar to Wilkins Model DUC.
   3. Gaskets: EPDM for operating temperature 160^{o}F and below. Viton for operating temperatures between 160^{o}F and 300^{o}F.

2.07 TRAP PRIMER VALVES

A. Bronze valve with removable operating parts, integral vacuum breaker, and gasketed access cover. Similar to Josam Series 88250.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Pressure Reducing Valves: Locate in piping where shown on drawings. Provide strainer upstream of pressure reducing valve, union adjacent to valve, and upstream and downstream isolation valves. Provide upstream and downstream pressure gauges. Adjust to pressure shown.

B. Pressure Safety Relief Valves: Install where shown and in accordance with manufacturer's recommendations. Pipe to nearest drain. Pressure relief setting as shown on drawings.

C. Pressure/Temperature Relief Valve: Locate on water heaters as shown on drawings and in accordance with Listing. Install in accordance with listing. Pipe valve discharge to safe location where water will drain into the building waste system. Drain piping size shall be same as valve outlet connection and discharge shall be visible.

D. Thermostatic Mixing Valves: Install thermostatic mixing valve where shown on drawings and as recommended by manufacturer. Adjust multiple fixture valves to maintain 105^{o}F discharge temperature.

E. Wye Strainers:
1. Locate strainers in piping where shown on drawings and ahead of reducing valves, automatic control valves, and pumps.
2. Install as recommended by manufacturer.
3. Arrange for easy access.

F. Di-Electric Unions: Wherever steel pipe is connected to copper pipe, or equipment containing copper, bronze, or cupro-nickel, use di-electric unions properly installed with no electrical path through connection.

G. Trap Primer Valves: Provide primer connection for each floor drain plumbing trap. Install primer valve in cold water piping to frequently used fixtures. Primer valves accessible after building completion. Isolation gate valve in piping to trap. Install in manifold where possible. Slope primer piping from trap seal primer valve to trap served.

3.02 WATER HAMMER ARRESTORS

A. Provide water hammer arrestors as follows:
1. Where indicated on Drawings.
2. Ahead of each solenoid valve.
3. In cold and hot water headers serving two or more fixtures.

B. Provide water hammer arrestors which have PDI size ratings indicated on Drawings. Where size is not indicated on Drawings, Contractor shall size as follows:
1. Calculate total fixture units, based on Oregon State Plumbing Specialty Code Table A-2, Appendix A.
2. Size each water hammer arrestor according to following PDI Standard WH-201 ratings for systems up to 65 PSI working pressure:
   a. 1-11 fixture units, PDI Size A.
   b. 2-32 fixture units, PDI Size B.
   c. 33-60 fixture units, PDI Size C.
   d. 61-113 fixture units, PDI Size D.
   e. 114-154 fixture units, PDI Size E.
   f. 155-330 fixture units, PDI Size F.
3. For systems over 65 PSI working pressure, provide the next larger size water hammer arrestor than listed above.

C. Installation:
1. Install in accordance with PDI Standard WH-201.
2. Provide access door where water hammer arrestor is concealed.

3.03 CLEANING

A. Clean all strainers after one week of system operation or sooner as required.

END OF SECTION

FUEL-FIRED DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide commercial grade, fuel-fired domestic water heater complete with all necessary accessories required for a complete and operational installation.

1.02 QUALITY ASSURANCE

A. Performance to exceed ASHRAE/IES 90.1b-1992.

PART 2 – PRODUCTS

2.01 CONDENSING-TYPE GAS-FIRED TANKLESS WATER HEATERS

A. Acceptable Manufacturer: A.O. Smith or approved equal.

B. General: Fully assembled, natural gas-fired, condensing water heater. Single point electrical connection. Approved for 0-inch clearance to combustibles. Suitable for use with sealed CPVC exhaust and combustion air intake. Maximum working pressure 160 psi. 91% thermal efficiency. Electronic Ignition. Similar to A. O. Smith ATI Tankless high efficiency condensing models.

C. Components:
1. Heat Exchanger: Copper primary heat exchanger, Type 316L stainless steel secondary heat exchanger.
2. Controls: Integrated solid state temperature and ignition control device with integral diagnostics, LED fault display capability, and digital display of temperature settings. Capability to manifold up to four separate units together with manufacturer-provided communication hardware and software to allow parallel linked operation with parent/child control.
3. Accessories:
   a. Condensate neutralizer.
   b. Flue termination kit.
   c. Heat traps as required by energy code.

D. Performance: Size and capacity as scheduled.

E. Pressure and temperature relief valve provided hereunder. See Section 22 12 00, PLUMBING SPECIALTIES.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install where shown on drawings in accordance with manufacturer's installation instruction.

B. Provide expansion tank sized to accommodate expansion in downstream domestic hot water piping. See Section 22 12 00 – PLUMBING SPECIALTIES.

C. Provide schedule 40 CPVC exhaust flue and outdoor air intake in accordance with manufacturer's recommendations.

END OF SECTION

COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

THIS PART NOT USED

PART 2 - PRODUCTS

2.01 SINKS

A. Acceptable Manufacturers:
1. Fixtures: Elkay, Just.
2. Faucets: Chicago, Delta, T&S Brass and Bronze Works.
3. Drains: Elkay, Just.
4. Supplies and stops: Chicago, McGuire Mfg. Co.

B. Sinks (S-1):
1. Fixture: Elkay LRAD-1919, single compartment, 18-gauge, type 304 stainless steel. Countertop, self-rimming. Undercoated. Bowl size 16”x13-1/2”x6-1/2” deep. 2 holes on 8-inch center.
2. Trim: Elkay LK-18B Type stainless steel stamped drain outlet with 1-1/2-inch chrome plated brass tailpiece.
3. Faucet: Chicago Model 1100-GN2AE35-317ABCP faucet with No. GN2A 5-1/4-inch swing spout, 4-inch wrist-blade handles, 1.5 gpm aerator, 8-inch centers.
4. Supplies and Stops: Chicago No. 1017 angle valve with loose key handle and lock shield cap. ½-inch I.P.S. female inlet, 3/8-inch O.D. flexible tubing. Wall flange, polished chrome plated finish.
5. Single Fixture Thermostatic Mixing Valve: Provided Hereunder. See Section 22 12 00, PLUMBING SPECIALTIES.

2.02 SHOWERS (SH-1)

A. Acceptable Manufacturers:
1. Shower Head: Acorn, Bradley, Powers, Symmonds.

B. Showers (SH-1):
1. General: Acorn Apex Type 5 surface mounted shower modules. Housing shall be tamperproof 14-gauge, Type 304 stainless steel all exterior surfaces polished to No. 4 satin finish. Modules shall be factory prepiped and hydrostatically tested to 150 psi by manufacturer. All internal piping shall be Type “L” copper tubing. Fittings shall be copper.
2. Shower Heads: Acorn Logan Wizard shower heads. Automatically soft-cleaning shower head, chrome plated, adjustable spray, 1.4 gpm flow control, tapped ½-inch I.P.S. vandalproof.
3. Faucets: Acorn, Apex T/P Temperature-Pressure Balancing mixing valves. Valves shall have removable operating parts including seat, individual stops, and chrome plated handle. ASSE 1016 compliant.
4. Accessories: Mounting brackets, individual stops, unit hot and cold shut-off valves, and stainless steel supply covers.

C. Showers (SH-1 Accessible):
1. General: Acorn Apex Type 5 ADA compliant surface mounted barrier-free shower modules with handheld shower. Housing shall be tamperproof 14-gauge, Type 304 stainless steel all exterior surfaces polished to No. 4 satin finish. Modules shall be factory prepiped and hydrostatically tested to 150 psi by manufacturer. All internal piping shall be Type "L" copper tubing. Fittings shall be copper.
2. Shower Heads: Acorn Logan Wizard shower heads. Automatically soft-cleaning shower head, chrome plated, adjustable spray, 1.4 gpm flow control, tapped ½-inch I.P.S. vandalproof. Separate hand shower with stainless steel 60-inch flexible hose with mounting bracket.
3. Faucets: Acorn, Apex T/P Temperature-Pressure Balancing mixing valves. Valves shall have removable operating parts including seat, individual stops, and chrome plated handle. ASSE 1016 compliant.
4. Accessories: Mounting brackets, individual stops, unit hot and cold shut-off valves, and stainless steel supply covers.

2.03 DRAINS

A. Acceptable Manufacturers:
1. Josam, J.R. Smith, NDS, Wade, Watts.

B. Shower Drains (SD-1)
1. Josam Series 30000-S coated cast-iron floor drain. Two piece body with double drainage flange. Invertible non-puncturing flashing collar, weepholes. 8" x 8" nikaloy square strainer.

C. Shower Drains (SD-2)
1. Josam Series 30000-R coated cast-iron floor drain. Two piece body with double drainage flange. Invertible non-puncturing flashing collar, weepholes. 4" x 12" nikaloy rectangular strainer.

D. Shower Drains (SD-3)
1. Josam Series 30000-A coated cast-iron floor drain. Two piece body with double drainage flange. Invertible non-puncturing flashing collar, weepholes. Bottom outlet and adjustable satin Nikaloy 5-inch round strainer.

E. Trench Drains (TD-1)
1. PVC channel drain with inverse flying buttress design, bottom flange and honeycomb reinforced walls, structural foam polyethylene grate, 6 foot & 2" outlet lengths, with UV inhibitor. Open surface area 11.3 sq. in./ft. non-slip segmented PVC grating. NDS Mini Channel Part No. 500 and 550 with No. 541 gray grate.

2.04 CLEANOUTS

A. Acceptable Manufacturers:
   1. Josam, J.R. Smith, Wade, Zurn, or approved.

B. Floor Cleanouts (FCO-1)
   1. Basis of Design: Josam Series 56000.
   2. Body: Coated cast iron with push-on gasket for connection to waste piping.
   3. Housing and cleanout plug: Adjustable with internally gasketed plug and secured round Nikaloy top.

C. Wall Cleanouts (WCO-1)
   1. Basis of Design: Josam Series 58790.
   2. Body: Coated cast iron cleanout tee, hub, and spigot connection, recessed bronze tapped plug.
   3. Access cover: Round stainless steel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Accurately plumb, horizontal and in-line. Exposed top or globe valve accessibly located when building is completed; locate behind or below fixture served; otherwise in branch piping as approved. Cast brass or 17-gauge fixture traps with cleanout plugs.

B. Drains: Examine floor rough-in to receive drain for unevenness, irregularities and incorrect dimensions that would affect quality and execution of installation. Do not install until rough-in is sufficient for proper installation. Coordinate installation of drain with other trades to insure watertight seal.

3.02 FINISH

A. Exposed metal parts and piping and under counters, polished chromium plated, unless otherwise specified. Baked white enamel escutcheons at ceilings, chrome plated at walls and floors.

3.03 PROTECTION

A. Fixture damaged during construction replaced with new and perfect fixtures without expense to Owner. Protect fixture and trim finish during construction with suitable covering.

3.04 MOUNTING HEIGHT

A. As shown on drawings or as recommended by manufacturer.

B. Wall hung water closets designated for handicapped use; mount between 18" and 19" rim height above floor.

END OF SECTION

HVAC INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Ductwork Insulation.

1.02 QUALITY ASSURANCE

A. Insulation materials and accessories shall be installed in a professional manner by skilled and experienced workers who specialize in commercial insulation work.

B. Products shall have flame spread and smoke developed ratings based on test procedures in accordance with NFPA-255 and UL 723. Rating shall be indicated on the product or on the shipping containers.

C. Unless otherwise specified, products shall have flame spread rating no greater than 25 and smoke development ratings no greater than 50.

D. Specified k factors are at 100^{o}F mean temperature unless stated otherwise. Where optional insulation material is used, select thickness to provide thermal conductance no greater than that for the specified material.

E. 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 DELIVERY, STORAGE, AND HANDLING

A. Every package or standard container of insulation or accessories delivered at the job site must have a manufacturer's stamp or label giving the name of the manufacturer and description of the material.

B. All of the insulation materials and accessories shall be delivered to the job site and stored in a safe, dry place.

C. If any insulation material has become wet in transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site.

PART 2 - PRODUCTS

2.01 DUCTWORK INSULATION

A. Acceptable Manufacturers: Manville, Owens-Corning, PPG, Certainteed.

B. Description: Blanket-type, thermal and acoustical, glass fiber insulation.
1. Thickness: Minimum 2-inch.
2. Density: Minimum 0.6- lb.
3. Service temperature 35^{o}F to 250^{o}F.
4. R-Value: Minimum installed R-value of 5.0 (hr – ft^{2}-^{o}F)/Btu.
5. Vapor Barrier: Foil-Scrim-Kraft laminated composite.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations and as specified.

3.02 DUCT INSULATION

A. Unless constructed of pre-insulated ductwork or shown on drawings as internally lined, insulate the following ductwork.
   1. Supply air ductwork
   2. Return air outside of conditioned spaces.
   3. Outside air ductwork.

B. Insulation materials shall be installed in a first class manner with smooth and even surfaces, with jackets and facings drawn tight and smoothly cemented down at all laps. Insulation shall be continuous through all sleeves and openings, except at fire dampers and duct heaters (NFPA 90A). Vapor barriers shall be continuous and uninterrupted throughout systems with operating temperature 60^{o}F and below. Lap and seal vapor barrier over ends and exposed edges of insulation. Anchors, supports and other metal projections through insulation on cold surfaces shall be insulated and vapor sealed for a minimum length of six inches.

C. Lap edges of insulation and seal all joints with vapor barrier tape set in vapor barrier lap adhesive.

D. Adhesive applied to bottom of duct in approximately 6-inch strips about 12-inches on center to adhere insulation to ductwork. Wire insulation securely in place.

END OF SECTION

FACILITY FUEL PIPING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Low Pressure Natural Gas Piping

1.02 QUALITY ASSURANCE

A. Conform to NFPA 54 - Natural Gas Code.

B. Conform to requirements of serving natural gas utility.

PART 2 - PRODUCTS

2.01 LOW PRESSURE NATURAL GAS PIPING

A. Above Ground and Inside Building
   1. Piping: ASTM A53, Schedule 40 black steel. Threaded ends and couplings, threaded ends without couplings, square cut with plain ends, or ends beveled for welding.
   2. Fittings:
      a. Up to 2 inches - ANSI B16.3, malleable-iron, 150 lb., black threaded.
      b. 2-l/2 inches and larger - ANSI B16.9, factory-made, wrought-steel, 150 lb., butt-welded fittings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations and as specified.

3.02 NATURAL GAS PIPING

A. Piping Installation
   1. Sleeve piping passing through underground footings and foundation walls. Seal sleeve to prevent entry of gas or water.
   2. Slope minimum l/4" per 15 feet to prevent traps. Grade to risers, meter, regulator or appliance.
   3. Support of piping: See Section 20 05 29 – PIPE HANGERS, SUPPORTS, SLEEVES, AND SEALS.
   4. Drips: In piping where condensate may collect. Install so accumulation of condensate will shut off flow before running back to meter.
   5. Cap outlets gas tight.
   6. Branch pipe connections: From top or side of horizontal pipe.
   7. Electrical bonding and grounding: Electrically continuous and bonded to grounding electrode as defined by NEC, ANSI-C1, NFPA No. 70.

B. Safety Shutoff: Provide safety shutoff valve at each equipment connection. Provide master safety shutoff valve at meter.

C. Joints or Abrasions: Exposed metal at joints or abrasions from shipping or installation coated and sealed watertight per utility requirements and as follows: thoroughly clean bare metal,

apply approved primer and wrap with Plyco-Flex. Apply minimum three wrapping thicknesses.

D. Purging: After tests and repairs, fully purge piping. Do not discharge into confined spaces. Purge appliances then light pilots.

END OF SECTION

METAL DUCTWORK

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Ductwork and accessories for HVAC systems.

1.02 DESIGN REQUIREMENTS

A. Ductwork construction shall comply with SMACNA "HVAC Duct Construction Standards – Metal and Flexible" including material thickness, seam and joint construction, and reinforcement.

B. Static Pressure Class: Minimum 2-inches water gauge or 200% fan unit external static pressure, whichever is greater.

C. Leakage Class: Air leakage from ductwork systems shall not exceed the amount listed below:
1. Rectangular ductwork: 4 cfm/100 square feet at 1-inch wg.
2. Round ductwork: 2 cfm/100 square feet at 1-inch wg.
3. Flexible ductwork: 4 cfm/100 square feet at 1-inch wg.

1.03 QUALITY ASSURANCE

A. Entire ductwork system provided in accordance with NFPA 90A.

B. Ductwork and components UL 181 listed as Class 1 air duct with flame spread rating not to exceed 25 and smoke rating not to exceed 50.

PART 2 – PRODUCTS

2.01 RECTANGULAR DUCTWORK

A. Material: galvanized steel, ASTM A527, G-60, except as listed below:
1. Shower exhaust: Aluminum ASTM B209 alloy 3003, H14 temper for shower exhaust from exhaust grille to branch connection.

B. Fabrication: Minimum gauge, duct construction, joint reinforcing, fittings, hangers, and supports shall be in accordance with SMACNA "HVAC Duct Construction Standards"
1. Transverse Joints: Joining systems manufactured by Ductmate, Roloc, or TDC are acceptable.
   a. Ductmate 25 is equivalent to SMACNA "F".
   b. Ductmate 35 is equivalent to SMACNA "J".

2. Crossbreaking: Diagonally cross break or bead using an automatic bead machine for panels 24 inches wide or larger, except cross break all panels for exterior applications. Beads shall be 1/8-inch deep and 12-inches on center.
3. Fittings: As detailed on drawings.
4. Sealing: Seal seams, joints, and connections with liquid duct sealer.

2.02 ROUND DUCTWORK

A. Material: galvanized steel, ASTM A527, G-60, except as listed below:
   1. Shower Exhaust: Aluminum ASTM B209 alloy 3003, H14 temper for shower exhaust from exhaust grille to branch connection.

B. Fabrication: Minimum gauge, duct construction, joint reinforcing, fittings, hangers, and supports shall be in accordance with SMACNA "HVAC Duct Construction Standards"
   1. Construction: Longitudinal or spiral seam.
   2. Lined round or oval ductwork rated over 2 inches wg: United McGill Acousti-K27 or approved.
   3. Seams: Longitudinal slip drive or spiral lock-seam, except provide spiral lock-seam where installed in finished spaces.
   4. Transverse Joints: beaded sleeve joints or flanges with gaskets.
   5. Fittings: As detailed on drawings. Long radius elbows with center line radius of 150% of diameter and welded. Mitered elbows shall be 5-gore.
   6. Sealing: Seal seams, joints, and connections with liquid duct sealer.

2.03 DUCT SEALANT

A. Liquid Duct Sealer, Indoors
   1. Acceptable Manufacturers: United McGill Corp., United Duct Sealer; Hardcast Inc. IG-601; Ductmate Proseal.
   2. Liquid duct sealer, UL listed flame spread rating not to exceed 25, smoke developed rating not to exceed 50.

2.04 FLEXIBLE DUCTWORK CONNECTORS

A. Acceptable Manufacturer: Duro Dyne Corp., Ventfabrics Inc., or approved equal.

B. General Applications:
   1. Fabric: Non-combustible, minimum 22 oz./sq.yard woven fiberglass fabric, 3-inch or 6-inch fabric width as required.
   2. Coating: Neoprene coated for interior locations, hypalon coated for exterior locations.
   3. Connectors: Match adjacent ductwork gauge and connection type.
   4. Fire Rating: Conform to NFPA 90A standards for burning characteristics.
   5. Basis of design: Duro Dyne, Neoprene or Durolon.

PART 3 - EXECUTION

3.01 EXECUTION

A. Ductwork dimensions shown on drawing are inside clear dimensions. Adjust outside metal duct dimensions to allow for duct liner.

3.02 INSTALLATION

A. Install ductwork and accessories in accordance with referenced SMACNA HVAC Duct Construction Standards, Metal and Flexible.

B. Moisture Laden Ductwork: Ductwork that transports airstreams that have a high moisture content in excess of 90% relative humidity shall be sloped continuously downward from exhaust outlet to exhaust inlet. Where low points are unavoidable provide a trapped condensate drain at low point. Route drain piping to a suitable drainage receptacle.

C. Joint Sealing: All duct joints sealed before insulating.

D. Flexible Connectors: Install at inlet and outlet connection to fans, except for fans that are internally isolated. Provide minimum 2 inches clearance between ductwork and fan connection for fan inlets or outlets smaller than 36 inches. For inlets or outlets above 36 inches, provide 4 inches clearance between ductwork and fan connection.

3.03 FIELD QUALITY CONTROL

A. Ductwork Cleaning:
1. Wipe down, vacuumed, or blown clean with compressed air before installation. All ductwork shall be sealed with plastic after cleaning and during assembly to keep ducts clean. All ductwork shall be shipped sealed to the job site and kept sealed until construction is complete. Store ductwork out of the weather at all times.
2. If heat is required in the building prior to finish of construction 100% outside air shall be used.
3. Fans shall be operated with construction filters installed, at full air volume for 24 to 48 hours after installation.

END OF SECTION

DUCTWORK HANGERS, SUPPORTS, AND SEALS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Support and bracing of HVAC ductwork.

1.02 RELATED SECTIONS

A. SECTION 20 05 45 – VIBRATION ISOLATION FOR MECHANICAL SYSTEMS

B. SECTION 20 05 48 – SEISMIC CONTROL FOR MECHANICAL SYSTEMS

1.03 QUALITY ASSURANCE

A. Provide ductwork hangers and support systems in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible.

B. Provide seismic bracing for ductwork in accordance with SMACNA Seismic Restraint Manual.

C. Alternative hanger, support, and bracing methods may be submitted. Approval will be based on demonstration that alternative methods provide equivalent function and satisfy the functional requirements for the referenced standards.

PART 2 - PRODUCTS

2.01 HANGERS & SUPPORTS

A. Materials: Structural support members, fasteners, and attachment in accordance with SMACNA.

B. Vibration Isolation: Acoustically isolate duct from structure where specified.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Hangers and Supports: Securely fasten all ductwork to the building construction by means of hangers, supports, guides, anchors, and sway braces to maintain duct alignment, to prevent sagging, and to prevent noise and excessive strain on ductwork due to movement under operating conditions.
   1. Maximum spacing between hangers shall not exceed eight (8) feet.
   2. Do not support ductwork from fans or any other pieces of equipment

END OF SECTION

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Manual Balancing Dampers

B. Roof Caps

C. Duct Liners

1.02 QUALITY ASSURANCE

A. Entire ductwork system provided in accordance with NFPA 90A.

B. Ductwork and components UL 181 listed as Class 1 air duct with flame spread rating not to exceed 25 and smoke rating not to exceed 50.

PART 2 - PRODUCTS

2.01 MANUAL BALANCING DAMPERS

A. Acceptable Manufacturers: Air Balance Inc; Flexmaster, USA Inc; McGill Airflow LLC; Ruskin, Vent Products.

B. Small balancing damper
1. Construction:
   a. Blade: 22-gauge galvanized steel.
   b. Hinge: 3/8-inch pin at each end of blade.
   c. Positioner: 3/8-inch locking quadrant at one end similar to Elgen No. RP-3C or RP-4C. Provide matching open-end bearings.
   d. Size: As shown on drawings with 1/8-inch clearance all around. Maximum 18-inches wide.

C. Medium balancing damper
1. Construction:
   a. Blade: 16-gauge galvanized steel.
   b. Hinge: 1/2-inch rod entire width.
   c. Positioner: 1/2-inch locking quadrant at one end similar to Elgen No. RP-3C or RP-4C. Provide matching open-end bearings. Brush chrome finish.
   d. Size: As shown on drawings with 1/8-inch clearance all around. Maximum 12-inches high and 48-inches wide.

D. Opposed blade balancing damper
1. Construction:
   a. Frame: Separate rigid frame installed in ductwork.
   b. Blade: Galvanized sheet metal bent at edge with groove in center for reinforcing.
   c. Hinge: Brass at each end of blade.
   d. Tie bar: Connected to each blade from control blade for simultaneous operation.
   e. Control blade: Continuous rod on blade extending through side.
   f. Positioner: 1/2-inch locking quadrant at one end similar to Elgen No. RP-3C or RP-4C. Provide matching open-end bearings. Brushed chrome finish.

g. Size: As shown on drawings. Maximum dimension 48-inches. Sizes larger than 48-inches made of multiple damper sets with common positioner.

2.02 ROOF CAPS

A. Acceptable Manufacturers: Greenheck, Loren Cook.

B. Description: Galvanized steel roof cap with galvanized bird screen and factory curb.

C. Refer to schedule on drawings.

2.03 DUCT LINERS

A. Flexible Fiberglass Duct Liner for Rectangular Ductwork
1. Acceptable Manufacturers: Manville "Permacote Linacoustic", Knauf Duct Liner M, Certainteed "ultralite".
2. Supply Air Duct: One inch thick, 1-1/2 lb. density. Minimum 70 NRC, minimum 0.25 k at mean temperature 75^{o}F. Black coating one side NFPA 90A approved. UL ratings less than flame spread 25, fuel contribution 50, smoke developed 50.
3. Outside Air Duct: 1-1/2 inch thick, minimum 70 NRC. Minimum 0.26 k at mean temperature of 75^{o}F. Black coating one side NFPA 90A approved. UL ratings less than flame spread 25, fuel contribution 50, smoke developed 50.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations and UL Listings.

B. Manual Balancing Dampers
1. Install in ductwork where shown on drawings and as required to properly balance airflow rates to values shown on drawings. Provide manual balancing damper of each air inlet and outlet.
2. Damper positioner shall be accessible. Where positioners are not accessible or are located above hard ceilings provide cable control extension.
3. Damper shall move freely throughout full range of travel.
4. Dampers shall be rigid and secure not producing any audible noise.

C. Duct Liner
1. Install inside of air ductwork where shown on drawings. Completely cover inside surface with adhesive and liner. All exposed edges and butt joints coated with adhesive. Fasteners and installation as recommended by manufacturer.
2. Plenums where shown as sound attenuated shall consist of reinforced steel outer housing, 2"inch duct liner, and an inner expanded metal liner bound together.

END OF SECTION

HVAC FANS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. In-line Centrifugal Fans (EF)

B. Cabinet Fans (CF)

1.02 QUALITY ASSURANCE

A. Fan performance ratings for air flow, pressure, power, air density, speed of rotation, and efficiency shall be factory tested and ratings established in accordance with AMCA Standard 210. Air foil blade fans shall bear AMCA rating seal.

B. Sound power level ratings shall be established in accordance with AMCA 300.

C. Equipment performance shall be calculated using actual project conditions.

1.03 DESIGN REQUIREMENTS

A. Equipment performance calculated using project site elevation.

1.04 REFERENCES

A. Air Movement and Control Association (AMCA):
   1. 210 Test Code for Air Moving Devices
   2. Test Code For Sound Rating

PART 2 – PRODUCTS

2.01 IN-LINE CENTRIFUGAL FAN

A. Acceptable Manufacturers: Loren Cook, Greenheck.

B. Description: Direct driven in-line type, centrifugal wheel, blade type as scheduled. Complete with motor, drive, ball bearings.

C. Housing: Heavy gauge steel, designed and reinforced to prevent vibration, air and water leakage. Maximum casing dimensions as shown on drawings. Furnish with necessary access panels to allow easy access for service and repair.

D. Fan: Centrifugal, blade type as scheduled. Bearing grease points extended to accessible side of unit for service.

E. Bearings: Air handler quality, self-aligning, grease lubricated, pillow block, selected for a minimum L10-80,000 hours at maximum cataloged operating conditions in accordance with ABMA-9. Grease fittings extended to accessible location.

F. Motor: Provided hereunder. See Section 20 05 13 – MOTORS FOR MECHANICAL EQUIPMENT.

G. Capacity: As scheduled on drawings.

2.02 CENTRIFUGAL CABINET FAN

H. Acceptable Manufacturers: Loren Cook, Greenheck.

I. Description: Belt driven in-line type, centrifugal wheel, blade type as scheduled. Complete with motor, motor starter belt guard, motor cover, adjustable motor sheave, drive, ball bearings.

J. Housing: Heavy gauge steel, designed and reinforced to prevent vibration, air and water leakage. Maximum casing dimensions as shown on drawings. Furnish with necessary access panels to allow easy access for service and repair.

K. Fan: Centrifugal, blade type as scheduled. Bearing grease points extended to accessible side of unit for service.

L. Bearings: Air handler quality, self-aligning, grease lubricated, pillow block, selected for a minimum L10-80,000 hours at maximum cataloged operating conditions in accordance with ABMA-9. Grease fittings extended to accessible location.

M. Motor: Provided hereunder. See Section 20 05 13 – MOTORS FOR MECHANICAL EQUIPMENT.

N. Motor Starters: Provided hereunder as scheduled, refer to SECTION 20 05 14 - MOTOR CONTROL DEVICES FOR MECHANICAL EQUIPMENT.

O. Capacity: As scheduled on drawings.

PART 3 - EXECUTION

3.01 INSPECTION

A. Install fan level and plumb as recommended by manufacturer.

B. Install fans with clearances for service and maintenance.

C. Make final connections with flexible connectors.

D. Ground equipment in accordance with manufacturer's recommendations. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values

E. Install belt guards.

3.02 FIELD QUALITY CONTROL

A. Equipment Start-up Checks
1. Verify shipping, blocking, and bracing has been removed.
2. Verify that unit is secure on mountings and supporting devices, and that connection to ducts and electrical components are complete.
3. Verify that proper thermal overload protection is installed in motors, starters, and disconnect switches. Adjust overload settings for fan motor rated load amperage.
4. Verify that cleaning and adjusting is complete.
5. Verify motor rotation direction.
6. Verify that fan wheel rotates freely and the bearing operation is smooth.
7. Verify lubrication of bearing and other rotating parts.

8. Verify that manual and automatic volume control dampers and fire and smoke dampers in ductwork work system are fully open.

B. Start-up Procedures:
   1. Energize fan motor.
   2. Measure and record motor voltage and amperage.

3.03 ADJUSTING

A. Align belts and sheaves.

B. Adjust belt tension in accordance with manufacturer's recommendations.

C. Lubricate bearings.

END OF SECTION

AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Diffusers and Grilles

PART 2 - PRODUCTS

2.01 DIFFUSERS, REGISTERS, AND GRILLES

A. Ceiling Supply Diffusers (SD-1)
1. Acceptable Manufacturers: Carnes, Krueger, Price Industries, Titus, Tuttle & Bailey. Similar to Titus TDC.
2. Type: Louvered face, removable inner vane assembly.
3. Material: steel.
4. Neck: Square or rectangular, size as shown on drawings.
5. Blow Pattern: 4-way or as shown on drawings. Provide adjustable vane assembly or movable deflectors to adjust vertical to horizontal blow pattern where shown on drawings.
6. Finish: White
7. Frame:
   a. Exposed: surface-mounted, beveled drop face.

B. Wall Supply Air Grille (SG-1)
1. Acceptable Manufacturers: Anemostat, Carnes, Krueger, Price Industries, Titus, Tuttle & Bailey. Similar to Titus 300 RL
2. Type: Double deflection, adjustable blade 1 ¼ inch border with countersunk screw holes, gasket.
3. Material: steel
4. Blades: Blades: ¾ inch, individually adjustable horizontal and vertical blades, front blades parallel to long dimension.
5. Finish: White
6. Frame: surface mount.

C. Return Air Grille (RG-1)
1. Acceptable Manufacturers: Anemostat, Carnes, Krueger, Price Industries, Titus, Tuttle & Bailey. Similar to Titus 350 RL
2. Type: Single deflection fixed blade, 1 ¼ inch border with countersunk screw holes, gasket.
3. Material: steel
4. Blades: ¾ inch, fixed between 35 to 45 degrees, parallel to long dimension.
5. Finish: White
6. Frame:
   a. Suspended T-bar ceilings: lay-in, 24x24 or 24x48 modules.
   b. Hard ceilings: surface mount.
   c. Walls: surface mount.

D. Exhaust Air Grille (EG-1)
1. Acceptable Manufacturers: Anemostat, Carnes, Krueger, Price Industries, Titus, Tuttle & Bailey. Similar to Titus 350 RL

2. Type: Single deflection fixed blade, 1 ¼ inch border with countersunk screw holes, gasket.
3. Material: aluminum
4. Blades: ¾ inch, fixed between 35 to 45 degrees, parallel to long dimension.
5. Finish: White
6. Frame:
   a. Hard ceilings: surface mount.

E. Exhaust Air Grille (EG-2)
1. Acceptable Manufacturers: Anemostat, Carnes, Krueger, Price Industries, Titus, Tuttle & Bailey. Similar to Titus 350 RL
2. Type: Single deflection fixed blade, 1 ¼ inch border with countersunk screw holes, gasket.
3. Material: steel
4. Blades: ¾ inch, fixed between 35 to 45 degrees, parallel to long dimension.
5. Finish: White
6. Frame:
   a. Exposed: surface mount.
   b. Walls: surface mount.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Inlets and Outlets
1. Install where shown on drawings. Notify Architect of conflicts between mechanical and architectural drawings.
2. Center on building features.
3. Locate in center of ceiling tiles.
4. Install plumb and square with walls and ceilings.
5. Mounted devices tight to finished surface
6. Secure grille and diffusers with flat head screws flush with border. Screw heads to match border finish.
7. Provide air tight connection between ductwork and diffuser.
8. Install return grilles so that blades prevent vision through grille.
9. Adjust airflow pattern control devices prior to balancing.
10. Paint ductwork behind return grilles, where visible, flat black.

END OF SECTION

GAS FIRED DUCT FURNACES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Gas Fired Duct Furnace

PART 2 - PRODUCTS

2.01 GAS FIRED DUCT FURNACE – DUCTED COMBUSTION AIR

A. Acceptable Manufacturers: Reznor, Modine, Sterling, or equivalent.

B. General: Factory assembled, separated combustion, 80% thermal efficient gas fired duct furnace completely factory assembled, piped, wired and tested. Unit complete with a factory installed power venter to draw combustion air from outside.

C. Components:
1. Casing: Galvanized steel with factory standard finish. Service access panels as required to access, burners, pilot and orifices. Units provided with threaded suspension couplings for pipe hangers.
2. Heat Exchanger: Corrosion resistant aluminized steel headers and tubes with tool pressed joints.
3. Burners: One piece burner assembly, aluminized with a stainless steel insert. Induced draft fan designed for ducted combustion air connection. Sealed combustion air inlet chamber with access door.
4. Fuel: Natural gas
5. Electrical Connections: Single point electrical connection
6. Controls:
   a. Direct spark ignition, electronic flame supervision with combustion air switch, flame roll out switch, high temperature safely limit switch, high and low gas pressure switches, and post purge control sequence. Low voltage terminal blocks.
   b. Capacity Control: Factory install discharge air temperature control with modulating burner capable of modulation between 50% and 100% of rated capacity. Integral discharge temperature sensor and packaged control system.
7. Accessories:
   a. Combination combustion air / flue gas venting assembly consisting of concentric combustion air duct and flue vent pipe with equipment connections and outdoor inlet and outlet terminations for vertical venting through roof.

D. Capacity: As scheduled on drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Support: Rigidly hang from galvanized steel rods and as recommended by manufacturer.

B. Gas Piping: Connect to unit. Union, 6-inch dirt leg and eccentric plug valve in gas supply.

C. Electrical Wiring: Connect to unit and wire controls as recommended by manufacturer.

D. Vent: Code approved with manufacturer's recommended installation methods. Size and length as recommended by manufacturer.

3.02 START-UP AND ADJUST

A. Start-Up Duct Furnace
1. Adjust burner input.
2. Adjust burner air adjustment.
3. Verify controls and safety devices operating satisfactorily.
4. Verify proper operation of vent.

END OF SECTION

BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Work hereunder includes a complete and operational, fully-tested, distributed logic, direct-digital control system upgrade and expansion for control of HVAC systems and equipment. Associated work includes but is not limited to:
   1. A network of stand-alone, microprocessor-based building controllers, custom application controllers, and application specific controllers.
   2. Communication, control wiring, and power wiring as required.
   3. Building operation and energy management software and related programming.
   4. Field Mounted Devices as specified in SECTION 25 30 00 – FIELD INSTALLED CONTROL SYSTEM COMPONENTS.
   5. Control sequences as specified in SECTION 25 90 00 – AUTOMATIC CONTROLS SEQUENCE OF OPERATIONS.
   6. Other materials and devices not shown as part of other work but necessary to provide mechanical and electrical system control and monitoring sequences specified.

1.02 RELATED SECTIONS

A. SECTION 25 30 00 – FIELD INSTALLED CONTROL SYSTEMS COMPONENTS

B. SECTION 25 90 00 - AUTOMATIC CONTROLS SEQUENCE OF OPERATIONS

1.03 PERFORMANCE REQUIREMENTS

A. Performance Standards:
   1. Graphic Display: System shall display a graphic with 20 dynamic points and all current data within 10 seconds.
   2. Graphic Refresh: System shall update a graphic with 20 dynamic points and all current data at no greater than 8 second intervals.
   3. Object Command. The maximum time between an operator command of a binary object and the reaction of the commanded device shall be 2 seconds. The maximum time between an operator command of an analog object and the start of object adjustment shall be 2 seconds.
   4. Object Scan. All changes of state and change of analog values will be transmitted on system communications networks such that any data used or displayed at a controller will have been current within the previous 6 seconds.
   5. Alarm Response Time. The maximum time from an object going into alarm to alarm annunciation at the workstation shall not exceed 45 seconds.
   6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. Contractor shall select execution times consistent with the process under control.
   7. Performance. Programmable controllers shall be able to execute BAS PID control loops at a selectable frequency of a least once per second. The controller shall scan and update the process value and output generated at the same frequency.
   8. Multiple Alarm Annunciations. All workstations on the network must receive alarms within 5 seconds of each other.
   9. Reporting Accuracy. The system shall report all values with an end-to-end accuracy no less than listed in Table 1.
   10. Stability of Control. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2.

TABLE 1
REPORTING ACCURACY

Measured Variable	*Reported Accuracy*
Space Temperature	$\pm 1^{o}F$
Ducted Air	$\pm 1^{o}F$
Note 1: 10%-100% of scale	
Note 2: For both absolute and differential pressure	
Note 3: Not including utility-supplied meters	

Table 2
CONTROL STABILITY AND ACCURACY

Controlled Variable	*Control Accuracy*	*Range of Medium*
Space Temperature	$\pm 2.0^{o}F$	
Duct Temperature	$\pm 3.0^{o}F$	

1.04 SUBMITTALS PRIOR TO STARTING WORK

A. Submit in accordance with SECTION 01 33 00 - SUBMITTALS within 6 weeks of project award.

B. All required schematics and plans prepared on AutoCAD release 12 or higher.

C. When manufacturers' product information applies to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the pertinent specification or drawing.

D. Building Automation System Hardware:
1. Provide a complete bill of materials of building automation control system hardware indicating quantity, manufacturer, model number, and technical data. Technical data shall include performance curves, product specifications sheets, and installation/maintenance instructions.
2. Network Communication Diagrams: Provide schematic diagram showing all BAS panels, communications cabling, and termination points. Identify power requirements and power source for each BAS panel. Identify equipment each BAS panel is controlling. Show termination numbers.
3. Provide plans indicating locations of all BAS hardware.
4. Provide panel interior and exterior layout details for prefabricated control panels. Details shall include equipment layout and routing of wiring and tubing.
5. Provide two copies of programming manuals for each BAS controller furnished.
6. Provide a listing and description of all available training programs. Indicate a cost for each location that the training program is available.

E. Central System Hardware and Software:
1. Provide a complete bill of materials of central system hardware and software indicating quantity, manufacturer, model number, and technical data. Technical data shall include product specification sheets and installation/maintenance instructions. Data shall be provided for all equipment including but not limited to the following:
   a. Central processing unit

b. Monitors
c. Printers
d. Keyboard
e. Power supply
f. Battery backup
g. Interface equipment between central processing unit and direct digital control panels.
h. Operating system software
i. Operator interface software
j. Color graphic software
k. Third-party software

2. Provide schematic diagram of the central system including all control, communication, and power wiring. Label all cables and ports with computer manufacturers' model numbers and functions.
3. Provide a list of color graphics screens to be provided. Indicate each screen content and relation to other screens.

F. Controlled Systems:
1. Provide an instrumentation list for each controlled system including all controlled system elements in table format. Tables to show element name, type of device, manufacturer, model number, and product data sheet number.
2. Provide a schematic diagram of each controlled system. Include control points labeled with appropriate point names. Graphically show the location of all control elements.
3. Provide a schematic wiring diagram for each controlled system. Label all elements. Label all terminals.
4. Provide a mounting, wiring, and routing plan-view drawing. Layout to account for HVAC, electrical, and other system design and layout requirements.
5. Provide a complete description of the function of each controlled system including sequence of operation.
6. Provide a points list for each system controller including both input and output (I/O) points. Note point designations, point function, controlled device associated with the I/O point, location of the I/O device, and point alarm requirements.

1.05 SUBMITTALS DURING CONSTRUCTION

A. Database Information: Four weeks prior to system start-up, provide two copies of complete database information for Engineers record. Database information will not be reviewed for conformance with Contract Documents. Database information shall include system configuration parameters, point definitions, alarm and trending parameters, control parameters, and control software programs. Specifically document all control functions that cannot be performed by applications specific controllers using pre-programmed control routines or which must be performed by supervisory control from a general-purpose controller.

B. Graphics: Provide three copies of all proposed graphics screens for review prior to installation. Allow 2 weeks for review.

C. Contractor Verification: Provide Contractor checkout and testing documentation.

1.06 CLOSEOUT SUBMITTALS

A. Submit in accordance with SECTION 01 78 39 - PROJECT RECORD DOCUMENTS.

B. Record documents shall include the following.
1. Project record drawings. Project record drawings will be as-built versions of the Shop Drawings. Include one set of magnetic media including CAD drawings in .DWG format.

2. Provide copy of testing and commissioning reports. Include trend logs used for verification.
3. Material to be included in Project Operation and Maintenance Manuals
   a. Names, addresses and 24-hour telephone numbers of installing Contractors and the service representatives for each.
   b. Operators manual with procedures for operating the control systems including logging on/off, alarm handling, producing point reports, trending data, overriding computer control, and changing set points and other variables.
   c. A listing and documentation of all custom software created using the programming language including set points, tuning parameters, and object database.
   d. A list of recommended spare parts with part numbers and suppliers.
   e. Recommended preventive maintenance procedures for all system components including a schedule of tasks, time between tasks, and task descriptions.
4. Supplemental Record Information
   a. Two sets of programming manuals with a description of the programming language (including syntax), statement descriptions (including algorithms and calculations used), point database creation and modification, and use of the program editor.
   b. Two sets of engineering, installation, and maintenance manuals explaining how to design and install new points, panels, and other hardware; preventive maintenance procedures; how to debug hardware problems; and how to replace or repair hardware.
   c. One set of magnetic/optical media containing backup files of the software and database.
   d. One set of magnetic/optical media containing files of all color graphic screens created for the project.
   e. One set of complete original issue documentation for third-party software including installation and maintenance instructions.
   f. One set of complete original issue diskettes for all operating systems, programming language, operator workstation software, and graphics software.
   g. One set of licenses, guarantees, and warranty documents for all system equipment.

1.07 QUALIFICATIONS

A. Control Contractor shall have a local office within 120 miles of job site capable of providing routine and emergency maintenance services on all system components. Five-year successful history in the design and installation of equipment and systems of same manufacturer and similar configuration to that proposed.

B. Control Contractor to have in-house, factory-trained and factory-authorized installers and programmers.

C. All products used in this application, except for those specifically indicated for reuse, shall be new and under current manufacture and shall be the most recent version offered by the manufacturer for the application. Spare parts shall be available from the manufacturer for at least five years after final completion.

1.08 CODES AND STANDARDS

A. Work, materials, and equipment shall comply with all local, state, and federal codes and ordinances including but not limited to the following.
   1. Each BASP shall be listed under UL916 (Energy Management Systems), UL864-UDTZ (Signal Systems Unit) and shall be tested to comply with sub-part J of Part 15 FCC rules for Class A computing equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Siemens Building Technologies to match existing.

2.02 SYSTEM CONTROLLERS

A. First-tier Controllers (Building Controllers): Independent, stand-alone, microprocessor-based controller to manage global control and communication. Provide the number of first-tier controllers needed to meet specified performance requirements. As a minimum, provide one first-tier controller per building. Controllers shall have the following general characteristics.
   1. Sufficient memory in each controller to support its operating system, database, and programming requirements including specified spare capacity.
   2. Controller operating system to manage input and output communications allowing distributed controllers to share real and virtual object information and allow central monitoring and alarms.
   3. Controller shall continually check the status of its processor and memory circuits. If an abnormal condition is detected, the controller shall assume a pre-determined failure mode, and generate an alarm notification.
   4. Controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.
   5. Controller shall include a service communication port allowing connection to a portable operator's terminal.

B. Custom Application Controllers: Independent, stand-alone, microprocessor-based controller to provide local control of systems and equipment requiring custom program sequences. Provide the number of custom application controllers needed to meet specified performance requirements. Controllers shall have the following general characteristics.
   1. Sufficient memory in each controller to support its operating system, database, and programming requirements including specified spare capacity.
   2. Controller operating system to manage input and output communications allowing distributed controllers to share real and virtual object information and allow central monitoring and alarms.
   3. Controller shall continually check the status of its processor and memory circuits. If an abnormal condition is detected, the controller shall assume a pre-determined failure mode, and generate an alarm notification.
   4. Controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.
   5. Controller shall include a service communication port allowing connection to a portable operator's terminal.

C. Application Specific Controllers: Independent, stand-alone microprocessor-based controller to control local equipment or systems where the associated sequence of operation can be met using pre-programmed control routines. Controllers should have the following general characteristics.
   1. Sufficient memory in each controller to control the target system.
   2. Non-volatile memory to maintain the BIOS and programming information in the event of a power failure.

D. Controller hardware suitable for the anticipated ambient conditions.
   1. Controllers used outdoors or in wet conditions mounted in NEMA 4 waterproof enclosures rated for operation at –40 degrees F to 150 degrees F.
   2. Controllers used in conditioned space mounted in dust-proof enclosures and rated for operation at 32 degrees F to 120 degrees F.

E. Provide diagnostic LEDs for power, communication, and processor. All wiring connections made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

F. All controllers shall operate at 90% to 110% of nominal voltage and perform an orderly shutdown below 80% nominal voltage. Operation protected against electrical noise at 5 to 120 Hz and from keyed radios up to 5 W at 3 feet.

2.03 INPUT/OUTPUT INTERFACE

A. Hardwire inputs and outputs may connect to the system through a first-tier, custom application, or application specific controller.

B. All input and output points protected so that shorting of the point to itself, to another point, or to ground will cause no damage to the controller. All input and output points protected from connected voltage up to 24V of any duration.

C. Binary Inputs: Binary controller inputs shall provide a wetting current of at least 12 mA and shall be protected against the effects of contact bounce and noise. Binary inputs shall sense “dry contact” closure without external power application required.

D. Pulse Accumulation Inputs: In addition to standard binary input characteristics, pulse accumulation inputs shall accept up to 10 pulses per second.

E. Analog Inputs: Analog inputs shall allow the monitoring of low-voltage (0 to 10VDC), current (4 to 20 mA), or resistance signals (thermistor or RTD). Analog inputs compatible with commonly available sensing devices.

F. Binary Outputs: Binary outputs to provide on/off control or a pulsed low-voltage signal for pulse-width modulation. Provide three-position (on/off/auto) switch for each output along with indicator light. Output selectable for normally open or normally closed operation.

G. Analog Outputs: Analog outputs to provide a modulating 0 to 10V or 4 to 20 mA signal for control of an end device. Provide two-position (auto/manual) switch, status lights, and manually adjustable potentiometer for each output. Analog output drift less than 0.4% of range per year.

H. Tri-state Outputs: Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point actuators limited to terminal unit and unit ventilator control applications. Control algorithms shall send the actuator to one end of its stroke every 24 hours for verification of operator tracking.

2.04 POWER SUPPLIES AND LINE FILTERING

A. Provide UL listed control transformers. Provide class 2 current-limiting type or furnish over-current protection in both primary and secondary circuits in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.

B. Provide transient voltage and surge suppression for all workstations and controllers either internally or as an external component. Surge suppression shall have the following minimum performance criteria.
1. Dielectric strength of 1000 volts minimum.
2. Response time of 10 nanoseconds.
3. Transverse mode noise attenuation of 65 dB or greater.
4. Common mode noise attenuation of 150 dB or better at 40 Hz to 100 Hz.

2.05 WIRING AND RACEWAYS

A. Provide wiring, plenum cable, and raceways in accordance with Division 26.

B. All insulated wire to have copper conductor. UL labeled for 90 degree C service.

PART 3 – EXECUTION

3.01 COORDINATION

A. Testing and Balancing
1. Provide to the Test and Balancing Contractor a set of all tools necessary to interface to the control system for testing and balancing purposes. Tools to be returned at the completion of test and balancing work.
2. Provide training in the use of the tools.
3. Provide a qualified technician to assist in the test and balancing process where required.

B. Coordinate with controls specified in other sections or divisions. Other sections or divisions include controls and control devices to be part of or interfaced with the control system specified in this section. Integration and coordination with these controls shall be as follows.
1. All communications media and equipment required to interface with equipment specified in other sections provided hereunder unless specifically stated otherwise.
2. Each supplier of a control product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequence of operation stated in SECTION 25 90 00 – AUTOMATIC CONTROLS SEQUENCE OF OPERATIONS.
3. Coordinate and resolve any compatibility issues arising between control products provided hereunder and those provided under other sections or divisions.

3.02 WORKMANSHIP

A. Install all equipment in accordance with manufacturers' recommendations.

B. Install equipment, piping, and wiring/raceway parallel to building lines wherever possible.

C. Provide sufficient slack and flexible connections in wiring and pneumatic tubing to allow for vibration of piping and equipment.

D. Install all equipment in readily accessible locations as defined by Chapter 1, Article 100, Part A of the National Electric Code.

3.03 GENERAL WIRING

A. All control and interlock wiring shall comply with national and electrical codes and Division 26. Where requirements of this section differ from those in Division 26, the requirements of this section shall take precedence.

B. ALL NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.

C. All low-voltage wiring shall meet NEC Class 2 requirements. Low voltage power circuits shall be sub-fused when required to meet Class 2 limits.

D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling plenum return air plenums, approved cable not in raceway may be used provided cables are UL listed for the intended application.

E. All wiring in mechanical, electrical, or service rooms and wiring located where it may be subject to damage shall be installed in raceway.

F. Do not install Class 2 wiring in raceways containing Class 1 wiring. Boxes and panels containing high-voltage wiring may not be used for low-voltage wiring except for the purpose of interfacing the two.

G. Do not install wiring in raceway containing tubing.

H. Where Class 2 wiring is installed exposed, wiring is to be routed parallel or perpendicular to building lines and neatly tied at a maximum of 10-foot intervals.

I. Where plenum cables are used without raceway, support or anchor cable from building structure. Do not anchor or support cable from ductwork, electrical raceways, piping, or suspended ceiling systems.

J. Provide all wire-to-device connections at terminal block or terminal strip. Provide all wire-to-wire connections at terminal block.

K. Neatly bundle wiring located within enclosures to permit access to devices and terminals.

L. Maximum allowable voltage for control wiring shall be 120V. If only higher voltages are available, Contractor shall provide a step-down transformer.

M. All wiring shall be installed as continuous lengths with no splices permitted between termination points.

N. Install plenum wiring in sleeves where it passes through walls and floors. Provide fire-stop foam where necessary to maintain fire rating.

O. Provide size of raceway and size and type of wire as required by NEC and as required to meet manufacturers' recommendations for connected equipment.

P. Include one pull string in each raceway 1-inch or larger.

Q. Use color coded conductors throughout.

R. Locate control and status relays in designated enclosures only. Such enclosures include packaged equipment control cabinets unless such cabinets also contain Class 1 starters.

S. Conceal all raceways except within mechanical, electrical, or service rooms. Maintain minimum raceway clearance of 6-inches from high temperature equipment such as steam piping or boiler flues.

T. Secure raceways with raceway clamps fastened to the structure and spaced in accordance with code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be supported from ductwork, electrical raceways, piping, or suspended ceiling systems.

U. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of all raceways.

V. Maintain updated wiring diagrams (as-built) at site with terminations identified.

W. Flexible metal raceways and liquid-tight, flexible metal raceways shall not exceed 3-feet in length and shall be supported at both ends. Flexible metal raceway less than ½-inch electrical trade size shall not be used. In areas exposed to moisture, including but not limited to chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.

3.04 COMMUNICATION WIRING

A. Install in accordance with 3.04 above.

B. Follow manufacturers' recommendations for all communications cabling including but not limited to maximum pulling, tension, and bend radius.

C. Do not install communications cabling in a raceway or enclosure containing Class 1 or other Class 2 wiring.

D. Verify the integrity of the entire network immediately following cable installation using test measures appropriate for each cable.

E. Provide a lightning arrestor between cables and grounds where cable enters or exits a building. Install arrestor in accordance with manufacturers' recommendations.

F. All communications wiring shall be un-spliced length when that length is commercially available.

G. All communications wiring shall be labeled to indicate origination and destination.

H. Ground coaxial cable in accordance with NEC regulations article on "Communications Circuits, Cable and Protector Grounding."

3.05 IDENTIFICATION OF HARDWARE AND WIRING

A. Label all wiring and cabling, including wiring and cabling terminating within factory-fabricated panels, within 2 inches of termination with the BAS address or termination number.

B. Label all pneumatic tubing at each end within 2 inches of termination with a descriptive identifier.

C. Permanently label or code each point of field terminal strips to show the instrument or item served.

D. Identify control panels with minimum 1/2–inch letters on laminated plastic nameplate.

E. Identify all other control components with permanent labels. All plug-in components shall be labeled so that removal of component does not remove label.

F. Identify room sensors relating to terminal box or valves with nameplate located within sensor cover.

G. Arrange components so that UL or CSA labels are visible after equipment is installed.

H. Identifiers shall match record documents.

I. Provide laminated network communication diagrams, point-to-point wiring diagramming, and process control diagrams in each control panel for control components contained therein.

3.06 BAS CONTROLLER INSTALLATION

A. Provide a separate BAS controller for each air handling unit or other discrete system. A BAS controller may control more than one system provided that all points associated with the system are assigned to the same BAS controller. Points used for control loop reset, such as outside air temperature or space temperature, are exempt from this requirement.

B. Building Controllers and Custom Application Controllers shall be selected to provide a minimum of 15% spare I/O point capacity for each point type. If input points are not universal, 15% of each type is required. A minimum of one spare is required for each type of point used.
   1. Future use of spare capacity shall require providing the field device, field wiring, point database definition, and custom software. No additional controller boards or point modules shall be required to implement use of spare points.

C. Provide sufficient internal memory for the specified sequences of operation and trend logging. Provide a minimum of 25% available memory free for future use.

3.07 PROGRAMMING

A. Provide programming for the system as required to perform the sequence of operation. See SECTION 25 90 00 – SEQUENCE OF OPERATION. Provide all other programming necessary for proper operation of the system but not specified including but not limited to time delays, control deadbands, equipment interlocks, equipment sequencing, alarm notification, and control sequences recommended by equipment manufacturers.

B. All control setpoints and loop tuning parameters accessible for review and adjustment at workstation graphics or through workstation menus without requiring modification of program code.

C. For systems using text-based programming, imbed comments in the programming code to clearly describe each section of the program.

D. Contractor to provide time scheduling functions as specified in the Sequence of Operations. Independent schedules shall be provided for each system, unless otherwise specified.

E. Contractor to provide alarming functions as specified in Sequence of Operations. Contractor shall also configure alarming functions as directed by Owner including setting alarm limits and differentials, states, type of notification, and alarm messages.

F. Contractor shall configure trending and functions as directed by Owner including trend data collection and report format.

3.08 GRAPHICS

A. Provide graphics for all controlled systems and floor plans of the building. As a minimum, systems requiring graphics to include each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. On each graphic, show input and output points for the system. Also, show relevant calculated points such as setpoints. Input, output, and software point valves shall be changeable from graphic screen.

B. Show terminal unit information on a “graphic” summary table. Provide dynamic information on each point shown.

3.09 CONTROL SYSTEM CHECKOUT AND TESTING

A. Contractor shall completely test and verify specified control system performance. Compile test results and include with written certification.

B. Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service all instruments, controls, and accessory equipment furnished hereunder.

C. Contractor shall perform the following testing and verification.

D. Verify that all control and communications wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
   1. Enable control systems and verify instrument calibration and end-to-end reporting accuracy of all input devices individually. Perform calibration in accordance with manufacturers' recommendations. Repair or replace all temperature sensors requiring a calibration offset greater than +/- 1°F.
   2. Verify control stability and end-to-end reporting requirements are met.
   3. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that normal positions are correct.
   4. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, start/stop and span are correct, and direction and normal position are correct.
   5. Verify that system operation complies with the sequence of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules.
   6. Tune all BAS control loops and optimum start/stop routines. Control loops shall have stable controlled variable equal to setpoint, and shall maintain stable output signal without cycling. Control loops shall be maintained with in +/- 1°F of setpoint or 2% of input sensor range. Output signal fluctuations shall not exceed 5% during normal operation.
   7. Alarms and Interlocks:
      a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
      b. Trip interlocks using field contacts to check the logic and ensure that the fail-safe condition for all actuators is in the proper direction.
      c. Test interlock actions by simulating alarm conditions to check the initiating value of the variable and the interlock action.

E. Contractor shall maintain the following documentation.
   1. Calibration log including date, time, control system readout, means of verification, verification measurement, and required calibration offset for each analog input.
   2. BAS Loop Response: Supply trend data output in graphical form showing the step response of each BAS loop. The test shall show the loop's response to a change in set point requiring a change in actuator position of at least 25% of full range. Provide sampling rate from 10 seconds to 1 minute depending on loop speed. Trend data shall show for each sample the set point, actuator position, and controlled variable values. Contractor shall retune any loop that indicates unreasonably under-damped or over-damped control.
   3. Demand Limiting: Supply trend data showing the action of any demand limiting functions. Document operation at maximum one-minute intervals for at least 30 minutes.
   4. Operational Logs: Provide operational trend logs for each system indicating set points, operating points, valve positions, mode, and equipment status. Logs shall cover three 48-hour periods and have a sample frequency of not more than 5 minutes. Logs provided in both printed and disk formats.

F. After system operation is completely verified, provide written certification to Owner that systems have been fully tested and are operating according to specifications and ready for functional testing. Provide copies of documentation signed by person performing tests. Documentation to include:
1. Calibration log
2. BAS Loop Response Trends
3. Demand Limiting Trends
4. Operational Logs

3.10 DEMONSTRATION AND ACCEPTANCE

A. Demonstration: Demonstrate operation of control system to Engineer and Owner including:
1. Menu functions.
2. Point overrides.
3. Control loop response after point modification.
4. Alarm response time.

3.11 TRAINING

A. Provide a minimum of 2 hours training to Owner's personnel in use and maintenance of BAS building management and control hardware and software.

END OF SECTION

FIELD INSTALLED CONTROL SYSTEM COMPONENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temperature Measurement

B. Relays and Switches

C. Automatic Dampers

D. Actuators

1.02 RELATED SECTIONS

A. SECTION 25 10 00 – BUILDING AUTOMATION SYSTEMS

B. SECTION 25 90 00 – AUTOMATIC CONTROLS SEQUENCE OF OPERATIONS

1.03 INITIAL PROJECT SUBMITTALS

A. Submit in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

B. Product Data: Provide manufacturer's technical product data for each component furnished as part of the control system. Data shall include dimensions, capacities, performance characteristics, electrical requirements, material finishes, and installation and start-up requirements.

1.04 CONSTRUCTION SUBMITTALS

A. Flow Transmitters: Submit verification report.

PART 2 - PRODUCTS

2.01 TEMPERATURE MEASUREMENT

A. Temperature Sensors
1. Acceptable Manufacturers: Mamac, Precon, or approved Direct Digital Control System manufacturer. (Mamac and Precon may not make accessories for space temperature sensors needed for the project i.e., set point adjustment, override switch, display, communications port)
2. Sensing element: Thermister type, +/- 0.5^{o}F from 32^{o}F to 150^{o}F accuracy, less than 0.25^{o}F drift/year. Compatible with BMCS analog input requirements. Select sensor with smallest range available that will span anticipated sensed medium temperature range.
3. Space Air Sensor: Range 40 to 90 ^{o}F, wall mounted with vandal-resistant heavy plastic or stainless steel cover. Provide stainless steel cage or other approved enclosure where sensors are susceptible to damage or vandalism.

B. Temperature Transmitters
1. Acceptable Manufacturer: Mamac, Precon, or approved Direct Digital Control System manufacturer.
2. Sensing element: 100 ohm, platinum RTD, +/- 0.65^{o}F @ 70^{o}F.

3. Transmitters: 4 to 20 mA output. Select sensor with smallest range available that will span anticipated sensed medium temperature range. NEMA Type 4 rated Instrument head suitable for housing RTD wiring terminations and temperature transmitter and temperature sensor.
4. Outside Air Sensor: Operating range -40 to 140 ^{o}F, stainless steel sensor sheath mounted in a weatherproof enclosure.
5. Ductwork Averaging Sensor: Multiple sensing elements contained in soft aluminum tubing. Sensors shall be a minimum of 1 foot in length for every 2 square feet of duct area.
6. Ductwork Probe Sensor: Aluminum or stainless steel sensor sheath, sensor probe length suitable for application.

2.02 RELAYS AND SWITCHES

A. Current Status Switches for Constant Load Devices
1. Acceptable Manufacturer: Hawkeye or approved equal.
2. General: Factory programmed current sensor to detect motor undercurrent situations such as belt or coupling loss on constant loads. Sensor shall store motor current as operating parameter in non-volatile memory. Push-button to clear memory.
3. Visual LED indicator for status.
4. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 2.5 A to 135 A.
5. Normally open current sensor output. 0.1A at 30 VAC/DC.
6. Similar to Hawkeye Model 908.

2.03 AUTOMATIC DAMPERS

A. Acceptable Manufacturer: Greenheck, Ruskin, or approved BAS manufacturer.

B. General: Opposed blade or parallel blade as indicated below or as shown on drawings.
1. Provide parallel blade dampers for outdoor/return air mixing dampers and face and bypass dampers. Arrange to direct air streams toward each other for optimum mixing.
2. Provide opposed blade dampers for all other modulating applications.
3. Two-position shutoff may be opposed blade or parallel blade type with blade and side seals.

C. Damper frames constructed from 13 gauge galvanized steel or 1/8-inch aluminum with reinforced corner bracing.

D. Damper blades shall not exceed 8 inches in width or 48 inches in length. Blades suitable for medium velocity applications up to 2000 fpm. Blades not less than 16 gauge.

E. Damper shaft bearings as recommended by manufacturer for application. Oil impregnated sintered bronze or better.

F. All blade edges and top and bottom of frame provided with replaceable butyl rubber or neoprene seals. Spring-loaded stainless steel side seals. Seals to maintain maximum leakage rate of 10 cfm per square foot of damper area at 4 inches w.g. Blades to be air foil type suitable for a wide-open face velocity of 1500 fpm with minimal noise output.

G. Individual damper sections not larger than 48 inches x 60 inches.

H. Provide dampers with linear flow characteristics to the extent possible.

I. Dampers shall have exposed linkages.

2.04 ACTUATORS

A. Acceptable Manufacturers: Belimo or approved equal.

B. Proportional Electric Actuator:
1. Direct coupled, spring return. Fully proportioning with ample power to operate valve or damper against fluid pressures and mechanical friction.
2. Size to provide specified valve shut-off pressure or damper differential pressure.
3. 0 to 10 VAC or 4 to 20 mA input control signal.
4. 24 VAC supply power. Suitable for use with Class 2 wiring. Maximum 10 VA for AC installations and 8 watts for DC applications.
5. Actuator shall have electronic overload or digital rotation circuitry to prevent damage to actuator through entire rotation range.
6. Actuators shall initialize when actuator is powered. Initialization will determine stroke length and enable actuator to set minimum and maximum limits of supplied control signal to ensure use of entire control signal range. Feedback automatically adjusted to the effective stroke.
7. Provide manual override and visual position indicator.
8. Provide NEMA Type 1 enclosures.
9. Globe Valve Service:
    a. Provide with automatic coupling device locking actuator to valve stem.
10. Damper Service:
    a. Direct shaft-mounted.
    b. Provide one actuator per damper section. No connecting rods or jack shafts allowed except where indicated on control drawings.
    c. Provide positive method of attaching actuator to damper shaft. If single bolt or set-screw is used, mill flat side on damper shaft to avoid slippage.

C. Two Position Electric Actuator
1. Direct coupled, spring return or last position as required. Ample power to operate valve or damper against fluid pressures and mechanical friction.
2. Size to provide specified valve shut-off pressure or damper differential pressure.
3. 0 to 24 VAC input control signal.
4. 24 VAC supply power. Suitable for use with Class 2 wiring. Maximum 10 VA for AC installations and 8 watts for DC applications.
5. Actuator shall have electronic overload or digital rotation circuitry to prevent damage to actuator through entire rotation range.
6. Provide manual override and visual position indicator.
7. Provide 2 to 10 VDC position feedback signal corresponding to actual valve or damper position.
8. Provide NEMA Type 1 enclosures.
9. Damper Service
    a. Direct shaft-mounted.
    b. Provide one actuator per damper section. No connecting rods or jack shafts allowed except where indicated on control drawings.
    c. Provide positive method of attaching actuator to damper shaft. If single bolt or set-screw is used, mill flat side on damper shaft to avoid slippage.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Locate field-mounted devices as shown on drawings and install per manufacturers recommendations.

3.02 SENSORS AND TRANSMITTERS

A. Provide temperature sensor for space temperature sensing applications.

B. Provide temperature transmitter for the following applications:
1. Ductwork Temperature with Averaging Sensor
2. Ductwork Temperature with Probe Sensor

C. Space Temperature Sensors:
1. Mount on wall or on ceiling pendant as shown on drawings.
2. For wall installation, mount on wall 60 inches above finished floor level in concealed junction boxes properly supported by wall framing.
3. For ceiling installation, mount on minimum 24-inch pendant, but not less than 84 inches above finished floor level.
4. Locate space temperature sensor to avoid localized heating or cooling effects from space equipment, lights, or diffusers.
5. All wires attached to sensors shall be air sealed in their raceways to prevent air transmitted from other areas from affected sensor accuracy.

D. Ductwork Temperature Transmitters:
1. Duct mounted sensors duct mounted in electrical box on duct exterior.
2. For outdoor applications, provide a weatherproof mounting box with weatherproof cover and gasket.

E. Ductwork Averaging Temperature Transmitter: Provide for mixed air applications, ductwork with a cross sectional dimension greater than 48 inches, and any application where non-uniform air temperature exists.

F. Ductwork Probe Temperature Transmitter: Size to position tip of probe in middle of air steam.

3.03 RELAYS AND SWITCHES

A. Current Status Switches:
1. Provide current status switch to monitor status of all motor-driven equipment where status is required.
2. Wrap power conductor through current transformer multiple times to amplify current signal where required.
3. Provide enclosure adjacent to existing motor starter when space in starter is not adequate to house current status switch.

B. Low Temperature Limit Switches: To allow testing, install with 12 inch loop of sensing element outside of fan housing. (Not applicable for outdoor installations.

3.04 AUTOMATIC DAMPERS

A. Provide a minimum of one damper actuator per damper section.

B. Unless specifically designed for vertical blade application, dampers mounted with blades horizontal.

C. Provide a visible and accessible indication of damper position on the drive end shaft.

D. Caulk between damper frame and ductwork to prevent leakage around perimeter of damper

3.05 ACTUATORS

A. Damper actuators shall not be installed in the air stream unless specified shown on drawings.

B. Provide weather shield where actuators are mounted outside of conditioned space.

C. Provide air gaps, thermal isolation washers or spacers, standoff legs, or insulation if required to ensure that actuator ambient temperature does not exceed actuator rating.

D. Actuator cords or conduit shall incorporate a drip leg if condensation is possible.

END OF SECTION

AUTOMATIC CONTROLS SEQUENCE OF OPERATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Description of Control Sequences.

1.02 WORK INCLUDED

A. The control system will consist of all necessary devices and software to provide the sequences of operation described herein.

B. Provide custom engineered BAS operating software to perform control sequences specified. Sequence of operations describes major control functions, but does not limit Contractor's responsibility to provide a fully operational automatic control system. Contractor shall provide additional control functions not specifically described herein including time delays, control deadbands, equipment interlocks, equipment sequencing, alarm notification, control functions recommended by equipment manufacturers, or as otherwise required.

1.03 DESIGN REQUIREMENTS

A. All safety control circuits interlocked with motor starters or VFDs shall be hardwired and shall function in all operating modes. (Automatic, Hand, and Manual Bypass)

B. Control setpoints and parameters listed in control sequences are initial values. Adjust setpoints and control parameters as directed by Engineer to achieved desired environment conditions, optimum system performance, and as recommended by TAB contractor.

C. Control setpoints shall be adjustable from the Operator Workstation without modification of control programming or use of proprietary software. All setpoints which are necessary for normal operation and optimization of system performance as required by Owner shall be adjustable, and shall include, but not limited to: time schedules; temperature, pressure, humidity, and CO_2 setpoints, time delay settings, safety sequence setpoints, and alarming parameters.

D. Where BAS network communications are provided to networkable control systems or equipment, Contractor shall configure accessible points for control, monitoring, and alarm as required to provide specified sequences and as directed by the Owner's Authorized Representative for trending and monitoring.

E. All cascade control sequences and closed control loops shall have proportional-integral action and derivative capability, except where approved otherwise.

F. Provide BAS alarm functions and configuration as detailed in plans and specifications, and as directed by Owner's Authorized Representative. Alarm functions may include:
1. Visual display on workstation graphic
2. Audible alarm at workstation computer
3. Listing in workstation alarm log
4. "Pop-up" alarm notification at workstation computer
5. Dial-out alarm to Owner's security staff or alarm monitoring service.

PART 2 - PRODUCTS

2.01 EXISTING AIR CONDITIONING UNIT

A. General: Existing natural gas package heating and cooling units. Existing control to remain, except as modified below.

B. Period of Operation:
1. Time Control: Provide time schedule of occupied periods. Operate according to existing occupied period control sequences. Provide occupied and unoccupied space temperature setpoints.
2. Occupancy Sensor Control: Override existing time schedule and operated system in occupied mode for 30 minutes whenever occupancy is detected.
3. Space Temperature sensor. Relocate existing temperature sensor in locker room as required to accommodate remodel.

C. BAS Input/Output Points List:
1. Provide all control points required to perform the automatic control sequence described above, which as a minimum shall include all points listed below. Where BAS points are obtained from communication interfaces with packaged equipment, the equipment connection is listed following the point description.
2. Digital Inputs:
   a. Space Occupancy.

2.02 CABINET FAN (CF-1)

A. General: Make-up air system consisting of supply fan, duct furnace, and exhaust fan.

B. Motor Control: Fans operate subject to existing on-off-auto switch motor starter as follows.
1. Auto Position: Operate motors subject to BAS time schedule to maintain Owner-defined occupied and unoccupied times for each day, including holidays. Start time modified by optimum start routine.
2. On Position: Override automatic control and start fan. Safety control sequences enabled.
3. Off Position: Fan off.

C. Mode Control:
1. Occupied Mode: Operate CF-1, EF-1, DF-1, and existing shower exhaust fan.
2. Unoccupied, Occupancy Detected: Operate CF-1, EF-1, DF-1 and existing shower exhaust fan.
3. Unoccupied, Occupancy Not Detected: CF-1, EF-1, DF-1, and existing shower exhaust fan off.

D. Duct Furnace: Operate subject to packaged control system provided with equipment to maintain a constant supply air temperature of 68^{o}F.

E. Isolation Dampers: Electrically interlock CF-1 and EF-1 isolation dampers with fan motor starters so that dampers are open when fans are on.

2.03 UNIT HEATERS

A. Electric Unit Heaters: Existing controls to remain un modified.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install complete control system including all components, devices, and accessories required to perform desired sequence of operation.

END OF SECTION

SUBMITTALS AND SHOP DRAWINGS

PART 1 - GENERAL

1.01 REQUIREMENTS

A. Refer to General Divisions for submittal requirements and procedures.

1.02 DEFINITIONS

A. Manufacturer's Product Data: Manufacturer's product data consist of one or more levels of manufacturer's information as described below and as requested in the submittal schedule. The three levels of information include: manufacturer's list, manufacturer's catalog data, and manufacturer's technical and engineering data.

1. Manufacturer's List: Manufacturer's list shall include a typewritten list of manufacturer's name, sizes and model or catalog numbers, referenced to the specification section.
2. Manufacturer's Catalog Data: Manufacturer's catalog data shall include standard catalog information marked to indicate specific equipment proposed and point of operation, if appropriate. Include installation instructions.
3. Manufacturer's Technical and Engineering Data: Manufacturer's technical and engineering data shall include materials, dimensions, details, installation instructions, weights, capacities, illustrations, wiring diagrams, control diagrams, piping diagrams, connection diagrams, performance data (including performance curves), mix design, and any other information required for a complete and thorough evaluation of the equipment or items specified, and to verify compliance with specifications. Control diagrams or control schematics, where specified and required by the submittal schedule, shall include a detailed schematic of the proposed control modifications and their interface with existing control equipment, where appropriate, and a manufacturer and model number listing of all proposed control components shown on the control schematic.

B. Shop Drawings: Shop Drawings are construction drawings of items manufactured specifically for this project. Shop Drawings include dimensions, construction details, weights, and additional information to identify the physical features of the system or piece of equipment.

C. Samples: Samples illustrate functional characteristics of the product with integral parts and attachment devices. Samples shall allow evaluation of full range of manufacturer's standard colors, textures, and patterns.

D. Certificates, Test Data or Other Information: Requirements for certificates, test data, or other information will be listed under referenced specification sections.

1.03 SUBMITTALS REQUIRED

A. Product Evaluation Data. The submittal schedule for product evaluation data is as indicated below. Each item requiring a submittal is given the following code:

1. Manufacturer's list
2. Manufacturer's catalog data
3. Manufacturer's technical and engineering data
4. Shop Drawings
5. Samples
6. Certificates
7. Test data

8. Worker's qualifications
9. See individual sections for special requirements

1.04 SUBMITTAL SCHEDULE

Division 26 – Electrical	Codes
Section 26 09 26 - Lighting Control Devices	2
Section 26 27 26 - Wiring Devices	1
Section 26 28 16 - Overcurrent Protective Devices	1
Section 26 29 13 - Motor and Circuit Disconnects	2,3
Section 26 51 13 - Indoor Lighting Fixtures, Lamps, and Ballasts	2,3
Division 27 – Communications	
Section 27 20 00 – Voice and Data Wiring	2,3,4
Division 28 – Electronic Safety and Security	
Section 28 31 00 - Fire Alarm System	2,3,4,9

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

A. The Contract Documents are complementary. What is required by any one, as affects this Division, shall be as binding as if repeated herein.

B. Separation of this Division from other Contract Documents shall not be construed as complete segregation of the Work.

C. Particular attention is called to Advertisement for Bids, Instructions to Bidders, Supplemental Instructions to Bidders, General Conditions, Supplemental General Conditions, Drawings and Specifications, and modifications incorporated in the documents before execution of the Agreement.

1.02 SCOPE OF WORK

A. General: Provide and install complete and satisfactorily operating electrical systems as specified in this Division, as shown on Drawings, as required, and as reasonably intended. Work generally includes, but is not limited to electrical distribution, lighting, devices, wiring systems and control systems.

B. Omissions: Omission of expressed reference to any item of labor or material necessary for the proper execution of the work shall not relieve responsibility from providing such additional labor or material.

1.03 EXAMINATION OF SITE

A. Examine Site of Work before making Bid and ascertain all related physical conditions.

B. Field verify scale dimensions shown since exact locations, distances and levels will be governed by actual field conditions.

C. Owner will not be responsible for any loss or unanticipated costs which may be suffered by the successful Bidder as a result of such Bidder's failure to fully inform himself in advance in regard to all conditions pertaining to the Work and character of the Work.

1.04 COORDINATION OF TRADES

A. Check Drawings of other trades to avert possible installation conflicts. Should major changes from original Drawings be necessary to resolve such conflicts, notify Architect and secure written approval and agreement on necessary adjustments before installation is started.

B. Check equipment connections and equipment locations on the job for coordination with other Divisions equipment and connections, structure, and the like.

1.05 MINOR DEVIATIONS

A. Make minor changes in equipment connections and equipment locations as directed or required before rough-in without extra cost.

1.06 SUBSTITUTIONS

A. Equal material of other manufacturer may be used following Architect's approval of a written request submitted at least 7 working days prior to prebid date.

1.07 RECORD DRAWINGS

A. Maintain a marked set of prints at job site at all times. Show all changes from contract drawings, whether visible or concealed. Dimension accurately from building lines, floor or curb elevations. Show exact location, elevation, and size of conduit, access panel and doors, and all other information pertinent to the work.

B. At project completion, submit marked set to Architect for approval.

1.08 WARRANTY

A. Warrant all work, materials, and equipment for one year.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.01 SCOPE

A. It is the intent of these documents to provide the necessary information and adjustments to the electrical system required to meet Code, and accommodate installation of the new work.

B. Contractor shall coordinate with the Owner so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas. The Owner will cooperate to the best of their ability to assist in a coordinated schedule, but will remain the final authority as to time of work permitted.

1.02 EXISTING CONDITIONS:

A. The locations of existing utilities and equipment are shown in an approximate way only and have not been independently verified by the Owner or its representative. The Contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages which might be occasioned by the Contractor's failure to exactly locate and preserve any and all utilities and equipment. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on the drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials accumulated during the demolition process are the Owner's property and shall be removed from the job site as directed by the Owner.

PART 3 - EXECUTION

3.01 DEMOLITION

A. Remove all existing fixtures, clocks, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless specifically shown as retained or relocated on the Drawings.

B. Disconnect all existing mechanical equipment scheduled for removal, relocation or abandonment. See mechanical Drawings for scope of work. Remove abandoned cables and unusable raceways. Relabel panels and motor control centers to reflect changes.

C. Maintain electrical continuity of all existing systems. Remove or relocate electrical boxes, conduit, wiring, equipment, fixtures, etc. as may be encountered in removed or remodeled areas in the existing construction affected by this work. Wiring which serves usable existing outlets shall be removed and restored clear of the construction or demolition. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, new conduit and wire shall be provided to bypass the abandoned outlets. If existing conduits pass through partitions or ceiling which are being removed or remodeled, new conduit and wire

shall be provided to reroute clear of the construction or demolition and maintain service to the existing load.

D. Extend circuiting and devices in all existing walls to be furred out.

E. Existing electrical outlets and light fixtures are denoted by dotted or dashed lines. Verify exact location of existing electrical outlets and light fixtures in the field. Only partial existing electrical shown. Locations of items shown on the Drawings as existing are partially based on as-built and other drawings which may contain errors. The contractor shall verify the accuracy of the information shown prior to bidding and provide such labor and material as is necessary to accomplish the intent of the contract documents.

F. Remove all abandoned wiring to leave site clean.

G. Keep outages to occupied areas to a minimum and prearrange all outages with the Owner's representative. Requests for outages shall state the specific dates and hours and the maximum durations, with the outages kept to these specific dates and hours and the maximum durations. This Contractor will be liable for any damages resulting from un-scheduled outages or for those not confined to the preapproved times. Outages shall take place at times when the facility is not in operation or occupied by non-essential personnel. Include all costs for overtime labor as necessary to maintain electrical services in the initial bid proposal. Temporary wiring and facilities, if used, shall be removed and the site left clean before final acceptance. Requests for outages must be submitted at least (5) days prior to intended shutdown time.

H. No circuit breaker or disconnects shall be turned off without prior approval from Owner. Coordinate with the Owner's representative responsible for the area or equipment affected for any electrical interruptions which affect the operation of the remaining portions of the facility.

I. Verify with the General Contractor a location for storage of materials, supplies, tools, rubbish, etc. prior to start of work.

END OF SECTION

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Wires and Cables.

B. Wire Connections.

1.02 REFERENCE STANDARDS

A. National Fire Protection Association (NFPA).
NFPA 70 National Electrical Code.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver new wire to Site in new standard coils or reels with approved tag denoting length, wire size, insulation type and manufacturer's name.

B. Protect from weather and damage during storage and handling.

PART 2 - PRODUCTS

2.01 CONDUCTOR AND CABLE MATERIALS

A. Building Wiring: 98 percent conductivity copper, 600 volt insulation, stranded. Type THHN for interior dry and damp locations. Type THWN or XHHW for wet and exterior locations.

B. Branch Circuit Wiring: Conductors smaller than No. 12 AWG for power system branch circuits not permitted.

C. Motor control wires shall be No. 14 minimum.

D. The use of AC or MC cables is not permitted.

E. Wire for special areas shall be as specified on the Drawings.

2.02 TWIST-ON CONNECTOR

A. UL pressure-type, solderless, insulated, wound spring grip twist on connector.

B. Solderless pressure connectors for terminals, taps, and splices.

2.03 TERMINAL, CRIMP-ON

A. Flat, fork tongue, self-insulating.

B. For connection of stranded wire to screw terminals.

C. T & B "Sta-Kon," or approved equal.

PART 3 - EXECUTION

3.01 CONDUCTOR AND CABLE INSTALLATION

A. Make conductor length for parallel feeders identical.

B. Lace or clip groups of feeder conductors at distribution centers, pullboxes, and wireways.

C. Provide copper grounding conductors and straps. A ground wire shall be pulled through conduits and used as the equipment grounding conductor.

D. Install wire and cable in code conforming raceway.

E. Use wire pulling lubricant for pulling No. 4 AWG and larger wire. UL approved type only.

F. Install wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.

G. Splice only in accessible junction or outlet boxes. Splice in feeders and services not permitted. Splices or taps in branch circuits permitted only in junction boxes where circuits divide.

H. Color code conductors to designate neutral, phase, and ground as follows:

CONDUCTOR	120/208 OR 120/240	277/480
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green
Switchlegs	Pink or Tan	Pink or Tan
Travelers	Purple	Purple
Fire Alarm	Red	
Intercom/Clock/Bell	Grey	
Security	Orange	
HVAC Control	Green	
Data/Telecom	White (CAT6)	

I. Wires shall be factory color coded by integral pigmentation. Colored plastic tape permitted on No. 6 and larger where integral pigmentation impractical. Apply tape in spiral half-lap over exposed portions in manholes, boxes, panels, switchboards and other enclosures.

J. All circuit conductors shall be identified with circuit number at all terminals, intermediate outlets, disconnect switches, circuit breakers, motor control centers, etc. Both ends of a given conductor shall be identified alike.

K. DO NOT install wires of different voltage systems in same raceway, box, gutter or other enclosure.

L. Radius of cable bends shall not be less than 10 times the outer diameter of the cable.

3.02 CONNECTIONS AND SPLICES

A. Follow manufacturer's instructions using manufacturers recommended tools.

B. Stripping Insulation: Carefully strip, avoid nicking conductor. No "ringing."

C. Design: Connectors shall be designed and approved for the purpose used. Connectors between aluminum and copper shall be listed "AL/CU" for the purpose of preventing electrolytic action.

D. Bare Connectors and Conductor Free Ends: Wrap with insulating rubber or friction tape to equivalent insulation of wire.

E. Ground Continuity to Metallic Surfaces: Remove any paint coating and polish surface beneath connection.

F. Copper conductors may be terminated in any approved compression or mechanical connector, including set screws.

G. No splices or taps permitted in feeder or branch circuit terminating in a single outlet.

H. Branch circuit splices and taps in junction and outlet boxes: Twist-on connectors.

I. Conductor and cable copper shall not be reduced at the terminal for making connections.

J. Slack shall be left at equipment, pullboxes, or outlet boxes to allow for a neat termination.

END OF SECTION

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Electric and power system grounding.

B. Communication system grounding.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Provide grounds in accordance with National Electrical Code and additional requirements as required herein.

B. NEC references below are based on the 2011 edition.

PART 2 - PRODUCTS

2.01 GROUNDING CONDUCTORS

A. Size: Table 250-66. Equipment grounding conductor: Table 250-122.

B. Material: Copper.

C. Protection: Conductors not in raceway or concealed shall be insulated. Provide conduit where shown or required for physical protection.

D. Bonding Jumpers: Same requirements.

PART 3 - EXECUTION

3.01 POWER SYSTEM GROUNDING

A. Circuit Grounding: Install grounding bushings, studs, and jumpers at distribution centers, pullboxes, motor control centers, panelboards, and junction boxes.

B. Ground Connections: Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated, the coating must be removed down to the bare metal. After the coating has been removed, apply a noncorrosive approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal, it shall be painted or touched up.

C. Conduit Systems:
1. Ground all metallic conduit systems.
2. Non-metallic conduit systems shall contain a grounding conductor.
3. Conduit provided for mechanical protection containing only a grounding conductor, bond to that conductor at the entrance and exit from the conduit.

D. Feeders and Branch Circuits: Install green grounding conductors with feeders and branch circuits as follows:
1. Feeders.
2. Circuits serving preparation and kitchen equipment.
3. Receptacle outlets.
4. Directly connected laboratory equipment.

5. Motors and motor controllers.
6. Fixed equipment and appliances.
7. Items of equipment where the final connection is made with flexible metal conduit shall have a grounding wire.
8. Additional locations and systems as shown.

E. Boxes, Cabinets, Enclosures, and Panelboards:
1. Bond the grounding wires to each pullbox, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass (except for special grounding systems for intensive care units and other critical units shown.
2. Provide lugs in each box and enclosure for ground wire termination.
3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs for terminating the ground wires.

F. Receptacles - Refer to Section 26 27 26 – WIRING DEVICES.

G. Ground lighting fixtures to the green grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

END OF SECTION

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Raceway Supports.

PART 2 - PRODUCTS

2.01 RACEWAY SUPPORTS

A. Single Runs: Steel rod hangers, galvanized single hole conduit straps, or ring bolt type hangers with specialty spring clips. Plumbers perforated tape or "J-nails" not acceptable.

B. Multiple Runs: Conduit rack with 25 percent spare capacity. Maximum width per manufacturer's recommendations.

C. Vertical Runs: Channel support with conduit fittings.

D. All hardware such as inserts, straps, bolts, nuts, screws and washers shall be galvanized or cadmium-plated steel.

2.02 ANCHOR METHODS

A. Hollow Masonry and Framed Walls: Toggle bolts or spider type expansion anchors.

B. Solid Masonry: Lead expansion anchors or preset inserts.

C. Metal Surfaces: Machine screws, bolts, or welded studs.

D. Wood Surfaces: Wood screws.

E. Concrete Surfaces: Self-drilling anchors or powder-driven studs.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.

B. Exact location and spacing between supports per manufacturer's recommendations and NEC requirements as minimum.

C. Conduit shall be installed in such a manner as to prevent the collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps wherever possible.

D. Conduit risers exposed in wire shafts shall be supported at each floor level by means of approved U-clamp hangers.

END OF SECTION

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Conduit, Tubing, and Fittings.

B. Flexible Conduit.

C. Electrical boxes and fittings as required for a complete installation.

1.02 REFERENCE STANDARDS

A. National Fire Protection Association (NFPA).
   1. NFPA 70 National Electrical Code--Chapter 3.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Conduit and Tubing: Galvanized steel rigid threaded conduit, electrical metallic tubing, intermediate metallic conduit, Schedule 40 PVC. Minimum size ¾".

B. Flexible Conduit: Steel armor, flexible plastic jacketed type with liquidtight connectors (liquidtight flexible metallic conduit).

C. Fittings:
   1. General: Approved for purpose. Water, concrete tight where required.
   2. Galvanized Rigid Steel Conduit (GRC): Threaded - no pressure type. Bushings with factory insulated throat.
   3. Electrical Metallic Tubing (EMT): Connectors and couplings to be case steel. Preinsulated connectors and couplings shall be compression, setscrew type. All connectors shall have insulated throats.
   4. Flexible Metallic Conduit: Clamp type, galvanized malleable iron with insulated throat.
   5. Liquidtight Flexible Metallic Conduit: Continuous copper ground in core; approved watertight.

D. Expansion Joints: Offset or sliding type with bending straps and clamps. Approved for purpose.

2.02 TYPE

A. Utilize GRC or IMC in concrete with concrete-tight connectors or exterior with watertight connectors.

B. Utilize electrical metallic tubing concealed in interior spaces or exposed in unfinished, interior where not subject to physical damage.

C. Utilize surface metal raceways for exposed runs in finished areas. Paint to match wall finish.

D. Make connections to motors and equipment with flexible metallic conduit or liquidtight flexible metallic conduit. Use liquidtight type in damp locations. Minimum size 1/2-inch for motor connections. Use 3/8-inch only for fixture and control wiring. Provide sufficient

length of flexible conduit to avoid transmission of vibration. Sizes not noted on the Drawings shall be as required by the NEC.

E. Utilize schedule 40 PVC with rigid steel elbows and risers under slab or underground.

2.03 OUTLET BOXES

A. Minimum Box: 4-inch box, 1-1/2-inches deep. Provide raised covers on bracket surface mounted outlets, plaster rings on flush outlets.

B. Flush Switch and Receptacle Outlets for One or Two Devices: 4-inch square box, 1-1/2-inches or more deep, with single or two-gang plaster ring.

C. Three or More Devices at One Location: Use one piece gang boxes with device cover, install one device per gang.

D. Provide galvanized steel interior outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices.

E. Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations. Choice of accessories is Installer's option.

F. Outlet Box Plate Covers:
1. Flush Mounting: Bevelled, pressure formed, type 302 stainless steel, match device installed.
2. Surface Mounting: Bevelled, steel, pressure formed.

2.04 WEATHERPROOF OUTLET BOXES

A. Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket and corrosion proof fasteners.

B. Weatherproof boxes to be constructed to have smooth sides, gray finish.

C. Boxes used in contact with soil shall be cast iron alloy with gasketed screw cover and water-tight hubs.

D. Weatherproof Plates: Cast metal, gasketed, for switches and receptacles provide spring loaded doors.

2.05 WEATHERPROOF JUNCTION AND PULL BOXES

A. Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type, shape and size, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

2.06 PULLBOXES

A. Pullboxes and Junction Boxes: Sheet metal (indoors) or cast metal (exterior or damp locations) construction, conforming to National Electrical Code, with screw-on cover.

B. Flush Mounted Pullboxes: Provide overlapping covers with flush-head retaining screws, finished in light gray enamel.

C. Box volumes shall meet NEC for size and number of entering conduits.

PART 3 - EXECUTION

3.01 RACEWAY INSTALLATION

A. Install conduit concealed in all areas excluding mechanical and electrical rooms, connections to motors, connections to surface cabinets, underfloor spaces, and above suspended ceilings.

B. For exposed runs, attach surface mounted conduit with clamps.

C. Coordinate installation of conduit in masonry work.

D. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt or moisture.

E. Clean out conduit before installation of conductor.

F. Alter conduit routing to avoid structural obstructions, minimizing crossovers. Bends and offsets shall be avoided where possible, but when necessary shall be made with an approved hickey or conduit bending machine. The use of a pipe tee or a vise for bending conduit will not be permitted.

G. Provide UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints and for long runs where conduit expansion may be excessive. Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.

H. Route all exposed conduits parallel or perpendicular to building lines.

I. Allow minimum of 6 inches clearance at flues, steam pipes, and heat sources.

J. Vertical Runs: Straight and plumb.

K. Raceways Running in Groups: Run at same relative elevation, properly spaced and supported.

L. Dissimilar Metals: Avoid contact with pipe runs of other systems.

M. Lengths and Bends: Maximum number of bends in any run shall be the equivalent of four quarter bends (360 degrees total). Maximum length of any run shall be 300 feet, less 50 feet for each equivalent quarter bend. Junction and pull boxes shall be provided to maintain these limits.

N. Provide waterproof seal for all exterior wall and underground raceway penetrations.

O. All empty raceways shall be provided with pull string or #12 conductor.

3.02 BOX INSTALLATION

A. Locate outlet boxes flush in areas other than mechanical rooms, electrical rooms, and above suspended ceilings.

B. For boxes mounted in exterior walls make sure that there is insulation behind outlet boxes to prevent condensation in boxes.

C. Coordinate location and mounting heights with built-in units. Adjust outlet mounting height to agree with required location for equipment served.

D. Locate pullboxes and junction boxes above suspended ceilings or in electrical rooms, utility rooms, or storage areas.

E. Support: Secure boxes independent of entering conduits, by attaching directly to structure with bar hanger, blocking or flat side bracket.

F. Identify each junction and pullbox with system description including branch circuit numbers of enclosed circuits.

G. Conduit shall be securely fastened to all sheet metal outlet, junction, and pullboxes with galvanized locknuts, and bushing.

H. Do not mount boxes back-to-back. Boxes on opposite sides of wall shall be separated by at least 3 inches.

END OF SECTION

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Permanent Identification of all electrical system components.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Identification shall conform to the latest edition of the National Electrical Code (NEC), Articles 110-21 and as a minimum requirement.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Laminated Plastic:
   1. Three layer, black front and back with white core.
   2. Engraved through outer layer to show white characters on black background.
   3. Beveled edges.
   4. Other colors as specified.

B. Panelboard Directory Card: Fiberboard neatly typed for newly installed panels. Circuit changes to existing panels shall be noted on the directory card by hand printing in ink. When more than five changes have been made on the directory card, a new card shall be typed.

PART 3 – EXECUTION

3.01 ITEMS TO BE IDENTIFIED

A. Motor starters, power panels, lighting panels and the disconnecting devices contained therein.

B. Disconnecting devices that are located in the area and not part of the items listed in 3.01 (A).

C. Control panels, starters, pushbutton stations, pilot lights and other control devices.

D. Transformers

E. Remote control devices

F. Conductors at both device and terminal strip terminations for control and instrumentation cables and conductors.

G. Other items as specified or noted.

3.02 USE OF NAMEPLATES AND TAGS

A. Panel designations, as described in paragraph 3.04 (A), and disconnecting devices in motor control centers shall be identified by nameplates that are engraved or etched. Nameplates that are engraved or etched shall have a black background with white letters. Letters for panel designations shall be a minimum of 1/2 inch high and letters for disconnect devices, mentioned in this paragraph, shall be smaller than the panel designation but have a minimum height of 3/8 inch.

B. Disconnect devices in lighting panels and power panels shall be identified on the panelboard directory card.

C. All wiring shall be identified with self-laminating, machine made thermal transfer labels.

3.03 APPLYING NAMEPLATES AND TAGS

A. Nameplates that are engraved or etched, shall be attached with screws.

B. Panelboard directory cards shall be placed in holders, provided for this purpose, located inside the panel doors.

3.04 IDENTIFICATION ON NAMEPLATES AND TAGS

A. The voltage designation shall also be shown on the nameplate.

B. Nameplates for disconnecting devices contained in panels and motor control centers shall show the equipment name and location by floor and column number. Voltage designation shall not be included when the voltage is the same as for the panel or motor control center.

C. Nameplates on disconnect devices located in the area but not part of a panel or motor control center shall have the equipment name, power source identification, and voltage designation. Nameplates for disconnect devices located remotely from the equipment shall also show the equipment location by floor and column number.

D. Nameplates on items listed in paragraph 3.01 (C) shall have the equipment name while the individual switches and lights shall have the function (such as start, stop, on, off, etc.).

E. Panelboard directory cards shall list the circuit numbers and show the equipment name and location supplied by the circuits. Equipment locations shall be shown by floor and column numbers or by room numbers.

END OF SECTION

LIGHTING CONTROL DEVICES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Provide lighting control equipment:
   1. Automatic wall switches
   2. Motion sensors

1.02 QUALITY ASSURANCE

A. Minimum Standards:
   1. UL 916 Energy Management Equipment
   2. NEMA enclosure standards

PART 2 - PRODUCTS

2.01 AUTOMATIC WALL SWITCH

A. Automatic wall switch shall be completely self-contained and shall replace standard toggle switch. Motion sensor shall sense motion by using both passive infrared, and sound technology.

B. Switch shall sense motion in room and switch 120 or 277 V electronic or magnetic ballasts using zero crossing circuitry.

C. Time delay and sensitivity shall be adjustable.

D. Switch shall be immune to RFI, EMI, and voltage fluctuations.

E. Switch shall have manual on / automatic off mode.

F. Acceptable products: Sensorswitch WSD-PST with switch or approved.

2.02 DUAL ULTRASONIC / INFRARED CEILING MOTION SENSOR

A. Motion sensor shall sense motion by using passive infrared and ultrasound sensors.

B. X Time delay shall be adjustable.

C. X Sensor shall be immune to false activation due to air movement.

D. Switch shall be immune to RFI, EMI, and voltage fluctuations.

E. Acceptable products: Sensorswitch CM-PDT, Unenco CU15000 2000 or approved.

2.03 MOTION SENSOR POWER PACK

A. Power pack shall be self-contained DC power supply and relay module. Relay shall be capable of switching 20 A ballast load using zero crossing circuitry. Power supply shall provide DC output to motion sensor.

B. Voltage to match fixtures controlled.

C. Power pack and ceiling motion sensor from same manufacturer.

D. Provide auxiliary contact for HVAC control.

E. Acceptable product: Sensorswitch PP-20, Unenco 2111, Unenco 2131, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

A. System shall be installed as shown on Drawings.

B. Motion sensor manufacturer shall verify Drawings to ensure coverage is adequate.

C. At Owner's request, return once within 60 days to adjust sensitivity of all motion sensors and to adjust programming of lighting control system.

3.02 WARRANTY

A. Light level sensors, automatic wall switches, and ceiling motion sensors shall have a 5 year warranty.

END OF SECTION

WIRING DEVICES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Wall Switches

B. Receptacles

C. Ground Fault Receptacles

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI).
1. 467 Grounding and Bonding Equipment (ANSI/UL467).
2. 498 Attachment Plugs and Receptacles (ANSI/UL498).
3. C73 Series Dimensions of Attachment Plugs and Receptacles.

B. Federal Specification (FS).
1. W-C-596D and E Specification for Electrical Power Connector, Plug, Receptacle and Cable Outlet.

C. National Electrical Manufacturer's Association (NEMA).
1. WD 1-79 General Purpose Wiring Devices.

D. National Fire Protection Association (NFPA).
1. NFPA 70 National Electrical Code.

E. Underwriters' Laboratory (UL).
1. UL-20 Standard for Snap Switches.

1.03 QUALITY ASSURANCE

A. Receptacles shall be Industry Class 5362.

B. Acceptable Manufacturers: Hubbell, P&S, Sierra, Bryant, Arrow-Hart, Leviton, GE, or approved.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Switches: 120/277 Volt. AC Quiet, slow make, slow break design, toggle handle, with totally enclosed case, rated 20 ampere, specification grade. Provide matching two-pole, three-way and four-way switches.

B. Switch and Pilot Light: Toggle action type with red handle, integral long-life neon pilot light, rated at 15 ampere, 120 volts.

C. Duplex Receptacles: Full gang size, polarized, duplex, parallel blade, U-grounding slot, specification grade, rated at 20 amperes, 125 volts (unless otherwise noted), designed for split feed service.

D. Ground Fault Receptacles: Specification grade duplex receptacle with integral ground fault circuit interrupter. Test and reset buttons. Matching wall plate.

E. Wall Plates: Satin stainless steel, Type 302. Nominal .040-inch thick. Match device configuration.

F. Nameplates: Provide engraved or embossed plastic nameplates for receptacles other than standard duplex receptacles indicating voltage, phase, amperes, circuit and panel.

G. Color: Provide gray switches and receptacles in all areas.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Furnish and install wiring devices of number, rating and type shown.

B. Devices to include appropriate outlet box, cover, wall plate and other necessary installation materials for a complete operating outlet.

C. Mount switches 42 inches (to center line of faceplate) above floor except as otherwise noted on the Drawings.

D. Coordinate switch mounting location with architectural detail.

E. Mount receptacles vertically at 15 inches (to bottom of faceplate) above finished floor, with grounding pole at top.

F. Coordinate receptacle height with benches and counters.

G. When mounting receptacle above bench or counter, mount horizontally with grounding pole at left.

H. Back wiring wells may be used for receptacles.

I. Grounding: Install a separate green or bare wire between the receptacle strap grounding (green) screw and a screw into the outlet box. Self-grounding strap not approved as grounding means.

END OF SECTION

OVERCURRENT PROTECTIVE DEVICES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Fuses

B. Circuit Breakers

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI).
1. C37.16 Preferred Ratings, Related Requirements, and Application Recommendations for Low Voltage Power Circuit Breakers and AC Power Circuit Protectors.
2. C37.17 Trip Devices for AC and General-Purpose DC Low-Voltage Power Circuit Breakers.
3. C97.1 Low Voltage Cartridge Fuses 600 Volts or Less.

B. Federal Specifications (FS).
1. W-C-375B/GEN Circuit Breakers, Molded Case; Branch Circuit and Service, Federal Supply Classification (FSC) 5925.
2. W-C-375/(1 through 20) Circuit Breakers, Molded Case, Branch Circuit and Service (FSC) 5925.
3. W-F-1814 Fuse Cartridge, High Interrupting Capacity. (FSC) 5920.

C. Institute of Electrical and Electronic Engineers, Inc. (IEEE).
1. 20-73 Low Voltage AC Power Circuit Breakers Used in Enclosures (ANSI C37.13- 73).

D. National Electrical Manufacturer's Association (NEMA).
1. FU-1 Low Voltage Cartridge Fuses.

1.03 APPLICABLE REGULATIONS

A. Underwriters' Laboratories (UL).
1. UL 489-72 Molded Case Circuit Breakers and Circuit Breaker Enclosures.
2. UL 198 E Class R Fuses.
3. UL 198.2 High Interrupting - Capacity Fuses, Current Limiting Type.
4. UL 869 Service Disconnects.

B. National Fire Protection Association (NFPA).
1. NFPA 70 National Electrical Code.

PART 2 - PRODUCTS

2.01 FUSES

A. Feeder, Branch Circuit and Service Entrance Fuses: 600 amperes and below, UL Class J or RK1 current limiting type, 600 volt 200,000 ampere interrupting capacity.

B. Motor and Inductive Circuit Fuses: UL class RK5 time delay current limiting type, 600 volt, 200,000 ampere interrupting capacity.

C. Control Circuit Fuses: UL Class J or R current, limiting type, 600V.

2.02 MOLDED CASE CIRCUIT BREAKERS

A. Circuit Breakers:
1. Connection to Bus: Bolt-on.
2. Thermal-magnetic, molded case, with inverse time current overload and instantaneous magnetic tripping unless otherwise shown.
3. Quick-make, quick-break, with tripped indication clearly shown by breaker handle taking a position between ON and OFF.
4. Multi-pole breakers shall have a common internal trip. No handle ties between single pole breakers.
5. Contacts: T-rated, for heavy duty switching applications.
6. Breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the breaker trip rating to prevent repeated arcing shorts resulting from frayed appliance cords.
7. Additions to existing panelboards and switchboards shall match or be compatible with existing.
8. Provide handle ties per NEC for breakers serving circuits with shared neutral conductors.
9. Where used as service disconnects, breakers shall be listed for use as service entrance equipment.

PART 3 - EXECUTION

3.01 FUSE INSTALLATION

A. Label each switch to indicate type and rating of fuse installed.

B. All fuses shall be selected to provide selective system coordination.

C. Provide 10% (3 minimum) spare fuses of each size and rating used.

3.02 CIRCUIT BREAKER INSTALLATION

A. Label each breaker located in switchboard or separate enclosure to indicate load served.

B. Adjust settings on breakers to operate properly under actual field conditions and to provide selective system coordination.

C. Update directory in panelboards which have new breakers installed.

END OF SECTION

MOTOR AND CIRCUIT DISCONNECTS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Provide and install motor disconnects as shown and as required by Codes.

B. Provide and install circuit disconnects as shown and as required by Codes.

C. Disconnects to include mounting stands, brackets, plates, supports, and required hardware and accessories for complete installation.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Conform to National Electrical Code and to applicable inspection authority.

B. Provide circuit and motor disconnects in the proper enclosure as required by NEC for the location installed unless more stringent requirements otherwise noted on the Drawings or herein.

1.03 REFERENCE STANDARDS

A. Underwriters' Laboratory (UL)
   1. Annual Product Directories
   2. UL-98 Enclosed Switches

B. National Electrical Manufacturer's Association (NEMA)
   1. NEMA KS-1 Enclosed Switches

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.

B. Three-Phase Disconnect Switches: Three-pole heavy duty quick make, quick break 600 volt. Number of poles and ampacity as noted or required by Code. Fusible where noted with fuse clips suitable for dual element fuses unless current limiting fuses are noted. Short circuit rating sufficient to withstand the available fault current or let-through current before the fuse melts without damage or changes in rating.

C. Compression or set-screw lugs approved for use with copper wire.

D. ON/OFF Positions: Clearly marked, lockable in "OFF" position.

E. Cover Interlock:
   1. Prevents switch from being opened when "on."
   2. Prevents closing switch when cover is open.
   3. Defeater to permit authorized personnel to open door and inspect switch when "on," or operate with cover open.

F. Enclosure for Dry, Indoor Locations: NEMA 1 minimum. Enclosures for outdoor locations: NEMA 3R minimum. Others as required for location installed.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install motor and circuit disconnects as recommended by manufacturer and as required by Code and UL.

B. Maintain Code clearances.

C. Provide a nameplate on each motor and circuit disconnect identifying the equipment item served. Where disconnect is to be installed in existing motor control center replace existing nameplate with new nameplate identifying new equipment item served.

END OF SECTION

INDOOR LIGHTING FIXTURES, LAMPS AND BALLASTS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. This Section includes supply and installation of luminaires, supports and accessories; and supply of plaster frames, trim rings and backboxes for plaster, tile, drywall or concrete ceilings.

B. Provide and install lamps in all light fixtures. Refer to lighting fixture schedule.

1.02 REFERENCE STANDARDS

A. National Electrical Manufacturer's Association (NEMA).
   1. NEMA LE1: Fluorescent Luminaires.

1.03 COORDINATION

A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer/Architect, and defer ordering until clarified.

B. Supply plaster frames, trim rings and backboxes to other trades.

C. Coordinate with Division 23 to avoid conflicts between luminaires, supports, fittings, and mechanical equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Refer to Fixture Schedule.

2.02 BALLASTS

A. Linear Fluorescent Electronic Ballast
   1. Program start, universal voltage, extreme system
   2. THD < 10%
   3. Ballast Power Factor > 99%
   4. 0 degree F minimum lamp starting temperature
   5. Operating input voltage +/- 20%
   6. Operating input frequency 50/60 Hz
   7. Audible noise rating “A” or better
   8. Output frequency > 40 KHz with no visible flicker
   9. Lamp current crest factor < 1.5
   10. Constant light output for line voltage variation of +/- 10%
   11. Ballast factor 0.71
   12. No PCBs
   13. 5 year warranty + $15.00 labor allowance.
   14. Meets FCC Class A specifications for EMI/RFI
   15. Meets ANSI C62.41 Cat A for transient protection
   16. UL listed
   17. Acceptable product: Osram Sylvania Xtreme System Low Ballast Factor, Advance, or approved.

B. Compact Fluorescent Electronic Ballast
1. Program rapid start
2. THD < 10%
3. Ballast Power Factor > 99%
4. 0 degree F minimum lamp starting temperature
5. Operating input voltage +/- 10%
6. Operating input frequency 50/60 Hz
7. Audible noise rating “A” or better
8. Output frequency > 25 KHz with no visible flicker
9. Lamp current crest factor < 1.5
10. Constant light output for line voltage variation of +/- 10%
11. Ballast factor > 0.95
12. No PCBs
13. 5 year warranty + $10.00 labor allowance
14. Meets ANSI C62.41 Cat A for transient protection
15. UL listed (Osram/Sylvania)
16. Acceptable product: Sylvania Quicktronic Professional or approved

C. HID Ballasts
1. Metal halide, pulse start.
   a. -40 degrees F minimum lamp starting temperature.
   b. Operation input frequency 50/60 Hz.
   c. Lamp current crest factor of 1.6.
   d. Constant Wattage multitap auto transformer (CWA) type.
   e. No PCBs.
   f. 5 year warranty and $10 labor allowance.
   g. UL listed.
   h. Acceptable Products: Venture Lighting, Advanced, Sylvania, or approved.

2.03 FLUORESCENT LUMINAIRES

A. Ballast to be listed at www.cee1.org

B. Prime coat and finish in high reflectance baked white enamel, two coats minimum on exposed and reflective surfaces, giving reflectance of 85 percent. Paint after fabrication.

C. Reflective plates: 22-gauge (0.80 mm) metal.

D. Provide 20-gauge (0.90 mm) steel housing.

E. Provide Hinged Frames with Catches; removable for cleaning without tools. Support lay-in lenses on four sides with flip ends on short dimension.

F. Provide gasketing, stops, and barriers to form light traps and prevent light leaks.

G. Design luminaire to dissipate ballast and lamp heat.

H. Use formed or ribbed backplates, endplates, reinforcing channels.

I. Suitable for mounting on low density ceilings, where applicable.

2.04 RECESSED LUMINAIRES

A. Recessed Incandescent Luminaires: Prewired type with junction box forming an integral part of the assembly.

B. Supply recessed luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area.

2.05 PENDANTS/CABLE HANGERS

A. Swivel sockets permitting normal fixture motion and self-adjustment. Adjustable to provide fixture height alignment.

B. One piece, white finish, with matching canopies.

C. Fixtures shall be factory counter-weighted and balanced to provide level hanging. Weights shall not be visible.

D. Cable hangers shall be adjustable for a minimum of 18”.

2.06 LAMP TYPE AND COLOR

A. Refer to Lighting Fixture Schedule.

B. All lamps of each type and color shall be by the same manufacturer.

2.07 INCANDESCENT LAMPS

A. Incandescent Lamps: 130 volt, extended service type.

2.08 LINEAR FLUORESCENT LAMPS

A. Low mercury, TCLP compliant, 85 CRI, 4100K color temperature.

B. Minimum of 3100 Initial Lumens.

C. Lamps to be listed at www.cee1.org

D. Acceptable manufacturers: Osram Sylvania F032/850/XPS/ECO3, GE, Philips.

2.09 COMPACT FLUORESCENT LAMPS

A. Low mercury, TCLP compliant 81 CRI, 4100K color temperature.

B. Acceptable manufacturers: GE, Philips, Osram Sylvania.

PART 3 - EXECUTION

3.01 COORDINATION

A. Refer to Reflected Ceiling Plans for exact locations with respect to ceiling construction.

B. Consult Finish Schedule for ceiling and wall construction and finish.

C. Prior to ordering lighting fixtures, coordinate style of mounting with ceiling construction and trim details for ceiling system finally selected.

3.02 SURFACE MOUNTING

A. Attach with means that will draw fixtures snugly to finished surface without bending or tipping. Twist-on clips with studs not allowed on exposed "T" grid ceilings, except where specified. Support from channel above ceiling framing members with bolt at each corner of fixture.

3.03 PENDANTS

A. Support from structure per paragraph titled “SUPPORT”.

B. Provide steel, stranded safety cable between fixture and structure to support fixture in the event of a pendant breakage.

3.04 SUPPORT

A. Suspended ceiling:
   1. Positively attach all light fixtures to the suspended ceiling system. The attachment device shall have a capacity of 150% of the lighting fixture weight acting in any direction.
   2. Support grid with No. 12 minimum gage hangers attached to the grid members within 3 inches of the corner of each fixture, attached to structure above.
   3. Attach two No. 12 minimum hangers from the fixture housing to the structure above. These wires may be slack.
   4. Where suspended fixtures do not align with grid, provide “bridging” above grid and support from structure.
   5. Support pendent-hung lighting fixtures directly from the structure above with No. 9 minimum wire or approved alternate support.

B. Support all other fixtures from structure by method rated at least five times support weight.

3.05 ACCESS

A. Recessed fixtures shall have code accessible supply. Use reach-through type fixtures in non-accessible ceilings or other suitable means. Coordinate with ceiling installer.

3.06 FIRE RATED CEILINGS

A. Where a ceiling carries a fire rating, recessed fixtures shall carry UL rating for use in protective enclosures. Coordinate installation of protective enclosures to provide sufficient air space for heat dissipation. 3 inch minimum all around.

3.07 CLEAN-UP

A. At time of acceptance, fixtures and lamps shall be clean, with visible labels removed. Touch-up any blemishes.

B. Remove ballast leakage and dispose of cleaning materials in accordance with EPA regulations.

3.08 FIXTURES AS RACEWAYS

A. Code Reference: NEC 410-31.

B. Through-Wiring: In continuous rows of fluorescent lighting, a connection to a single point in the row indicates that the branch circuit conductors are to be routed through the fixture wiring compartments and a connection made to each ballast.

3.09 LAMP INSTALLATION

A. Install lamps in accordance with manufacturer's instructions.

3.10 EXTRA STOCK

A. Provide extra lamps of all types, based on initial lamping quantity: Incandescent 25%, all others 10%. Where a fraction occurs, round up to next larger integer.

3.11 BURNOUT REPLACEMENT

A. Make replacements from extra stock as required until 90 days after Substantial Completion date. Deliver remaining lamps to Owner.

END OF SECTION

VOICE AND DATA WIRING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install all labor and materials required for the installation of a complete voice and data cable infrastructure.

1.02 QUALITY ASSURANCE

A. Do all work in accordance with the guidelines published in EIA/TIA standard 568 and 569. Where conflicts exist, the plans and specifications shall take precedence.

B. All workers involved in the installation and termination of cable shall have at least two years of experience. No less than 33% of the workers on the job shall have attended a vendor sponsored training program covering installation and termination of cable.

1.03 SUBMITTALS

A. Submit complete and descriptive shop drawings in accordance with Section 01 33 00. Include data for wall jacks, cable, and a layout for each IDF and MDF terminal board.

1.04 GUARANTEE

A. Guarantee all work against faulty and improper material and workmanship for a minimum period of one (1) year from the date of final written acceptance by Owner, except where guarantee or warranties for longer terms are specified herein.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Copper Cable: AMP

B. Termination Hardware: AMP

C. Outlets: AMP

D. Requests for substitution of other products will be considered if submitted in accordance with Section 01 60 00.

2.02 HORIZONTAL DISTRIBUTION

A. All UTP cable shall be 4-pair cable, of 23AWG solid copper conductors under a common sheath. Cable must meet the requirement for Category 6 standards and be rated for use in the environment in which it is used.

B. UTP cables shall terminate on 110-type terminating Category 6 modular RJ-45 patch panels and shall be provided and installed in equipment racks. Rack mount wire management panels are to be installed between each pair of 48 jack port mount 110 type modular patch panels.

C. All voice and data outlet plates shall be of a modular design capable of accepting interchangeable RJ-11, RJ-45, video F connectors, BNC, fiber ST or MT-RJ connectors or blank inserts into a single plate. Plates shall be nylon, 4 port single gang, color to match adjacent power receptacle plates.

D. Each outlet shall have UTP cables terminated on CAT 6 RJ-45 jacks. Quantity of jacks as indicated on the floor plans, but no less than two per plate.

E. Wall phone outlets shall have one 4 pair UTP cable terminated in a single gang plate.

F. All Data UTP station cable to terminate on 8-pin CAT 6 RJ-45 inserts. Wiring configuration (568A 568B) as directed by Owner. Inserts shall be designed to permit them to be disconnected from the plate without removing the cable, and reinstalled on another plate. In addition to wall mounted outlets, include outlets in modular furniture and floor boxes.

2.03 CONNECTOR CABLES

A. Provide one data connector cable for each data jack. 50% shall be 6 feet and 50% shall be 12 feet in length. Data grade, category 6 with RJ-45 male connector on each end.

B. Provide one, 6 foot min. telephone connector cable for each telephone jack. Voice grade, category 6 with RJ-11/45 compatible male connector on each end.

C. Provide one, 1-foot patch cable for each patch panel jack. Data grade, category 6 with RJ-45 male connector on each end.

PART 3 - EXECUTION

3.01 EXECUTION

A. The Contractor shall furnish and install all cabling in accordance with these specifications, and as indicated on the cable schedules and drawings.

B. Install each cable as an uninterrupted conductor section between the designated termination points, unless otherwise directed by the cable installation specifications. There shall be no splices or mechanical coupler installed between the cable points of origin and termination except as shown on drawings and/or specifications.

C. Desk locations in private offices are unknown. Where outlets are located on opposite sides of the office, leave sufficient cable coiled up in the ceiling to permit the jacks to be removed from the plate and the jack and cable to be installed on the opposite side of the room.

D. Unless otherwise noted, all cable shall be rerouted though the building low voltage cable tray/conduit system where available.

E. Contractor is responsible for insuring that cable jacket is suitable for the environment in which it is placed, i.e., CM, CMR, CMP rated.

F. All cable shall be attached to building structure except as noted below, at intervals not to exceed 6 feet.

G. At the same time cable is pulled into a cable pathway, also install a pull string of appropriate size to facilitate future cable pulls along those pathways.

H. Install “J-hooks” or reusable “o-rings” for horizontal cable support. Coordinate location of support hardware to avoid conflicts with other trades.

I. At no point will any station cable be tie wrapped or fastened to the cable tray. After cables have exited the cable tray they will be tie wrapped to the “J-hooks”. The tie wraps will be clinched snug enough around the cable bundle to keep them uniform and in the hooks, but not so tight as to damage the construction of the cables themselves.

J. Installation of workstation cables shall be coordinated with the modular furniture system contractor. Prior to the furniture system installation, the workstation cables will be pulled near the “stub-ups” or poke-thrus” and left coiled with enough slack to reach the eventual outlet location. After the modular furniture systems are installed and walls are finished, the contractor will pull cable to the outlet locations and complete the cable installation.

K. Provide firestopping at all locations where cables penetrate fire rated surfaces. Materials and methods used shall be acceptable to the code authority having jurisdiction and shall maintain the fire integrity of the wall, floor, or ceiling.

3.02 CABLE IDENTIFICATION

A. Cable tags containing a unique cable ID designator shall be placed on both ends of all cables, 6 inches from the connector and/or termination blocks. Also, label all backbone cables passing through telecommunications rooms. Each label shall be pre-printed with the appropriate cable number as indicated. Hand written cable labels are not acceptable.

B. Individual station outlets shall be labeled with the designator of the cables terminated at that particular outlet.

C. If at any time during the job the cable tag becomes illegible or removed for whatever reason, the Contractor shall immediately replace it with a duplicate pre-printed cable tag at the Contractor’s expense.

D. Labeling sequence to be determined by the Owner and to be followed by the Contractor.

3.03 TERMINATION HARDWARE

A. Quantities of termination blocks, racks, splice enclosures, and patch panels, etc. shown on drawings are illustrative only and are meant to indicate the general configuration of the work. The Contractor is responsible for providing the correct quantities of termination hardware required to terminate, patch, cross connect, etc. the volume of cable described herein and shown on the drawings. Rack quantities shall be no less than what is shown on the drawings.

B. At all times during the construction, the Contractor shall protect the equipment from damage and theft. Equipment shall not be installed until such time as other trades have completed their work in the area.

3.04 CABLE TERMINATIONS

A. Twisted pair metallic cables: After dressing cable to its final location the sheath shall be removed to a point that allows the conductors to be splayed and terminated in a neat and uniform fashion. Every effort must be made to maintain sheath integrity by removing only as much as is practical to accomplish termination. Cable pair twist shall be maintained up to the

point of termination. Under no circumstances shall cable pairs be untwisted or otherwise altered beyond ½" per EIA/TIA-568.

B. Cross-connect wire: Cable pair twist shall be maintained up to the point of termination. Under no circumstances shall cable pairs be untwisted or otherwise altered prior to termination.

3.05 CROSS-CONNECT

A. Perform all cross-connects and patching.

B. Furnish cross connect cables and perform all necessary cross-connect and patches as indicated in these specifications. Utilize cross-connect wire, and 25 pair cable as necessary. Cut all cross-connect wire to length, leaving enough slack to form a "3-finger loop". After completion of work, dress patch cords and cross-connect wire in cable management apparatus. Do not tie-wrap cross-connect wires into bundles. The Contractor is responsible for all cross-connect schedules and documentation to the Owner/Consultant on completion of project. Patch cables shall be same brand as the patch panel jacks.

C. Telecommunication entrance room: Cross-connect all pairs of the "voice" station cable to the "voice" backbone.

3.06 GROUNDING

A. All metallic cable tray, ladder rack, raceways, cable sheath/armor, enclosures, and equipment racks and other conductive surfaces shall be properly bonded to the grounding system. All paint and other coatings shall be removed at all contact surfaces to ensure proper ground.

B. Furnish and install an insulated #6 copper ground wire from all telecommunication rooms to the main building electrical ground point in the main electrical room. Drawing notes indicating a larger size shall take precedence.

C. Ground all cable shields, ducts, connector panels and grounding blocks.

D. All grounding shall be in compliance with the NEC code Article 800, Article 250, as well as EIA/TIA standard 607.

3.07 CABLE TESTING

A. Copper:
1. Visually inspect all cables, cable reels, and shipping cartoons to detect cable damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.
2. Conduct cable testing as described below upon completion of installation. Test fully completed systems only. Piecemeal testing is not acceptable, except by prior written approval from the Architect.
3. After terminating both ends, but before any cross connects are installed, test all UTP voice and data stations cables for attenuation and for near-end cross talk (NEXT) to 100 Mhz. Test all UTP backbone, distribution and patch cable for cable pair/conductor continuity, ground fault, proper cross-connect, shorts, loose connectors, and crossed pairs.
4. Remove all defective cables from pathways system. Do not abandon cables in place.

3.08 ACCEPTANCE

A. Upon receipt of the Contractor's documentation of cable testing, the Architect will review the installation and may request a retest using contractor equipment and labor, of up to 5% of the cable/wires installed.

END OF SECTION

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install a complete and satisfactory operating addition to the existing automatic fire alarm and detection system.

B. System to include control panel modifications, detection devices, notification appliances, manual stations, accessories, raceways, wiring, batteries, and any other necessary accessories and installation materials.

C. Provide plans, specifications, equipment list and calculations for permit review by the Fire Marshall.

1.02 DESCRIPTION OF SYSTEM

A. Supervised non-coded annunciated multiplex style, addressable, solid state system with intelligent analog alarm initiation.

B. System Operation:
1. Alarm Caused By: Activation of any automatic detection or manual device, or water flow within sprinkler system.
2. Alarm Initiation to Cause:
   a. Audible and visual zone identification at Control Panel and annunciators.
   b. Lamp to light in base of initiating detector; or if detector is concealed from view, light a remote lamp at nearest visible location.
   c. Closing of selected supply air dampers and HVAC units.
   d. Transmission of alarm to remote monitoring station via 2 line automatic telephone dialer.
   e. All smoke and fire doors to close.
   f. All horns to sound selected tone.
   g. All strobes to flash.
3. Audible alarm may be manually silenced at Control Panel. Alarm signal circuit and zone alarm light shall remain initiated until actuated devices have been restored to normal and Control Panel reset.
4. Trouble Signal Caused By:
   a. An open or short in detector or signaling loop wiring.
   b. Removing any initiating or signaling device from system.
   c. Moving any sprinkler system valve from the full open position.
   d. Failure of battery charger.
5. Trouble initiation to cause: audible and visual indication at the Control Panel.
6. Audible trouble indication may be silenced at Control Panel. Trouble circuit and zone light to remain initiated until trouble corrected.
7. Trouble circuit to be self-restoring after correction of problem, or have automatic "ring-back" if left in silenced condition.
8. Alarm shall override trouble.

1.03 PLAN SUBMITTAL AND INSPECTION REQUIREMENTS

A. Plans and Specifications submittal: Three complete plans and specifications for fire alarm systems shall be submitted for review and approval prior to system installation. Plan review fees must be paid before picking up the approved set of plans. Plans and specifications shall be submitted to the Permit and Information Center. Provide owner with a copy of the approved plans.

B. Plans and specifications shall include, at minimum, the following information. Provide additional information as required by Fire Marshall.

C. Floor plan with rooms labeled and occupancy use noted.
1. Location of all initiating, notifications devices, control panel, and remote annunciator.
2. Mounting heights and ceiling description where detectors are installed.

D. Point to point system wiring diagram
1. Devices, controls, and end-of-line location for each circuit.
2. Number of conductors and wire gauge for each circuit run
3. Zone identification

E. Voltage drop calculation
1. Devices, length, resistance of wire, and end-of-line voltage for each circuit

F. Battery calculation.

G. Other information required by the local authority having jurisdiction.

H. Location and Security: The alarm control unit, remote annunciator panel, and access keys to locked fire alarm equipment shall be installed and maintained in a lock box location approved by the Fire Marshall. Lockbox to be provided by the Contractor. Written operating instructions shall be provided within the alarm control unit. Lock box to meet requirements of fire marshal.

1.04 REFERENCE STANDARDS

A. NFPA 72: National Fire Alarm Code

B. NFPA 101: Life-Safety Code

C. Uniform Fire Code

D. Oregon Structural Specialty Code

E. UL-STD 864, UL-UOJZ

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Match existing

2.02 FIRE ALARM MASTER PANEL

A. Features:
1. Solid-state. "Mother/Daughter" board configuration.
2. Plug-in modules.
3. Separately fused inputs.
4. Multiple two wire addressable communication loops for zones and devices required.
5. Supervision and sensitivity testing of all circuits and devices.
6. All necessary 24 VDC power supplies.
7. Alarm reset switch.
8. Ground fault indicator.
9. Lamp test switch or lamp supervision.
10. Trouble silencing switch: self-restoring, or with ring-back.
11. Separate system trouble indicator: Supervises circuits and control panel wiring.
12. Audible and visual trouble indication including location and address of device. Visual indication shall be English language readout.
13. Power-on indicator.
14. Separate supervised alarm and trouble indicators for each circuit.
15. Detector circuit to accommodate intermixing of all types of detection and contact devices without resistors or circuits compensating devices at each initiating device.
16. Terminals for remote annunciators and controls.
17. Addressable auxiliary contacts: Two each NO/NC for alarm and trouble.
18. Fire drill switch and an audible alarm silence switch.
19. Detector sensitivity, calibration and identification to be supervised by control panel. Detector sensitivity capable of being changed from the control panel.

2.03 MANUAL STATIONS

A. Addressable non-coded semi-flush mount, single-action, fully compatible with ionization and thermal detectors. Key reset, so that once station has been pulled, it cannot be reset by unauthorized personnel. Bright red finish. Engraved "FIRE ALARM."

B. Provide protective shields for all manual pull stations unless otherwise noted. Tamper-proof, clear lexan shield and red frame that easily fits over manual pull stations. When shield is lifted, it sounds a loud, piercing warning horn. Battery-operated horn. Acceptable Example Model: Safety Technology International Stopper II.

2.04 THERMAL DETECTORS

A. Addressable Combination Rate of Rise/Fixed Temperature:
1. Plug-in base, interchangeable with other detectors, 2-wire loop operation.
2. Alarm indicator lamp.
3. Rate of Rise Initiation: 15^{o}F rise over a one-minute period.
4. Fixed temperature initiation: 135^{o}F or 200^{o}F, as shown.
5. Integral communications and built-in device type identification.

2.05 SMOKE DETECTORS

A. Features:
1. Optical sensing, photoelectric type addressable smoke detector.
2. No moving parts.
3. Alarm indicator LED to pulse only for trouble and alarm signals.
4. Capable of having sensitivity tested and adjusted.
5. Nominal 24V DC 2-wire loop operation.

6. Provision for connecting a remote alarm lamp.
7. Terminal base connection.
8. Concealed socket head screw to prevent tampering.
9. Integral communications and built-in device type identification.
10. The detector shall be capable of bi-directional communication with the control panel.
11. The detector shall be dynamically supervised and uniquely identifiable by the control panel. The control panel shall be capable of analyzing the signal of the detector's analog value for calibration, identification and sensitivity. These values can be displayed by the control panel and monitored for processing according to control panel instructions. The detector's sensitivity shall be individually adjustable from the control panel. Should the detector sensitivity voltage shift beyond an acceptable level and stay there for a predetermined length of time, a discrete detector trouble signal shall be annunciated at the control panel.

B. Duct detectors shall be similar with duct mounting enclosure, sampling tubes, remote test and reset station. Provide relay base with each duct detector. Connect to shut down associated HVAC unit upon alarm.

2.06 COMBINATION HORN/STROBE

A. Electronic Horn:
1. Selectable horn or temporal (Code 3) tones.
2. 3 selectable dBA levels: 90, 95, 99 dBA Anechoic at 10’ for both tones.

B. Electronic Strobe:
1. Capable of being synchronized by adding synchronization module.
2. 0.2 sec maximum pulse duration with 40% duty cycle.
3. Flash rate of 1 Hz to 2 Hz.
4. Clear or nominal white light source not to exceed 1000 cd.
5. Minimum intensity: 75 candela. 15/75 candela unit is not acceptable.

C. Audio and strobe inputs shall be supervised.

2.07 ELECTRONIC HORN

A. Selectable horn or temporal (Code 3) tones.

B. 3 selectable dBA levels: 90, 95, 99 dBA Anechoic at 10’ for both tones.

C. Exterior horns shall be weatherproof and listed for outdoor use.

2.08 ELECTRONIC STROBE

A. Capable of being synchronized by adding synchronization module.

B. 0.2 sec maximum pulse duration with 40% duty cycle.

C. Flash rate of 1 Hz to 2 Hz.

D. Clear or nominal white light source not to exceed 1000 cd.

E. Input shall be supervised.

F. Minimum intensity: 75 candela. 15/75 candela unit is not acceptable.

2.09 WIRING

A. Type:
1. UL listed limited energy cable for fire protective signaling.
2. Conductors: Minimum size No. 18 AWG, solid, color coded, shielded where required by manufacturer.
3. Overall PVC jacket, red color.
4. Belden Fire Alarm Cable or equivalent.

B. Size: The sizes and quantity of the different wires shall be those specified by the manufacturer. Color code shall be used where specified.

2.10 TRANSPARENT NOTIFICATION DEVICE GUARD

A. Install as shown on Drawings.

B. Strobe light loss shall not exceed 35%.

C. Horn sound loss shall not exceed 6 dB(a).

D. Non-transparent cowl shall not block side of strobes.

E. Flush-mounted notification devices shall have flush mount compatible covers where indicated on Drawings.

PART 3 - EXECUTION

3.01 WIRING

A. Raceway:
1. Raceway not required where wiring is accessible and concealed above ceiling or in chase. Raceway is required in all other areas.
2. Install surface non-metallic raceway for surface wiring in finished areas. Install conduit in all other areas where raceway is required.

B. Wire:
1. All wires shall be tagged at all junction points and shall be free from ground or crosses between conductors.
2. One-inch conduit between the FACP and the central station transmitter connection as indicated. Install number of conductors and electrical supervision for connecting wiring as required to suit central-station monitoring function. Provide telephone conductors, jacks, and boxes for connection between transmitter and MPOP.

3.02 INSTALLATION

A. Manufacturer to provide supervision of installation and make final connection of tagged wiring.

B. Maintain existing system fully operational until new has been tested and accepted. As new equipment is installed label existing equipment "NOT IN SERVICE UNTIL ACCEPTED".

C. Ground equipment and conductor and cable shields. For audio circuits, minimize to the greatest extent possible ground loops, common mode returns, noise pickup, cross talk, and

other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

D. The Contractor shall provide for a communication line from the fire alarm master to the building security panel for monitoring alarm conditions. The Contractor shall pay all costs associated with connecting to the building security panel.

3.03 FIELD QUALITY CONTROL

A. Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

C. Final Acceptance Test: Test the system according to the procedures outlined in NFPA 72. Minimum required tests are as follows:

1. Verify the absence of unwanted voltages between circuit conductors and ground.
2. Megger test all conductors other than those intentionally and permanently grounded with electronic components disconnected. Test for resistance to ground. Report readings less than 1-megaohm for evaluation.
3. Test all conductors for short circuits utilizing an insulation-testing device.
4. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on the record drawings.
5. Verify the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
6. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of the initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
7. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test smoke detectors with actual products of combustion.
8. Test the system for all specified functions according to the manufacturer's operating and maintenance manual. Systematically initiate specified functional performance items at each station including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications. Observe all voice audio for routing, clarity, quality, freedom from noise and distortion, and proper volume level.
9. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the period and in the manner specified.

D. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

E. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log upon the satisfactory completion of tests.

F. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.

3.04 CLEANING AND ADJUSTING

A. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

3.05 CERTIFICATION

A. The installer shall provide written certification to the fire marshal and to the Owner that the system has been installed in accordance with the approved plans and specifications.

END OF SECTION