PROJECT MANUAL

UNIVERSITY OF OREGON

HEALTH AND COUNSELING CENTER HVAC SYSTEM REPLACEMENT

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

February 13, 2012

SYSTEMS WEST ENGINEERS, INC.

411 HIGH STREET
EUGENE, OREGON 97401-2427
Phone: 541.342.7210
Fax: 541.342.7220
www.systemswestengineers.com

K010.06

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UNIVERSITY OF OREGON
HEALTH AND COUNSELING CENTER
HVAC SYSTEM REPLACEMENT

FEBRUARY 13, 2012

Owner:
University of Oregon
Capital Construction
1295 Franklin Boulevard
Mr. Jeff Madsen
Eugene, Oregon 97403-1276
Phone (541) 346-2256
Fax (541) 346-2299

Mechanical/Electrical Engineer:
Systems West Engineers, Inc.
411 High Street
Eugene, Oregon 97401
Mr. Steve Hoffman, PE Mechanical
Mr. Jeff Graper, PE Electrical
Phone (541) 342-7210
Fax (541) 342-7220

Structural Engineer
Hohbach-Lewin, Inc.
Structural Engineers
296 East 5th Avenue, Suite 302
Eugene, Oregon 97401
Ms. Vikki Bourcier, SE
Phone (541) 349-1701
Fax (541) 349-1702

Architectural
University of Oregon
Kevin Spahn
Project Architect
1295 Franklin Boulevard
Eugene, Oregon 97403-1276
Phone (541) 346-8238
(541) 346-6927

SWE #K010.06

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DRAWINGS

OREGON UNIVERSITY SYSTEM

NOTICE OF RETAINER CONTRACT OPPORTUNITY

The Oregon University System (OUS) is accepting sealed bids for a public improvement project at 1295 Franklin Blvd, Eugene, OR 97403 until **2 PM**, Pacific Time, March 9th, 2012 for the Health & Counseling Center HVAC Upgrade project located on the campus of University of Oregon, in Eugene, Oregon. The project includes modification of existing HVAC system to reconfigure air flow and incorporate chilled beams. Bids will be publicly opened by the undersigned or a designated representative at the designated close of bids.

A **mandatory pre-bid conference** will be conducted at 10:00 am, Thursday, February 23rd, 2012. Bidders shall meet with OUS' Representative at the North entry vestibule of the University Health and Counseling Center on the southwest corner of Agate Street and 13th Ave for that purpose. Attendance will be documented through a sign-in sheet prepared by the OUS representative. Prime bidders who arrive more than 5 minutes after start of time of the meeting (as stated in the solicitation and by the OUS 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 **at no charge from Systems West Engineers (541) 342-7201.**

Bid packets may be examined at University of Oregon, Facilities Services 1295 Franklin Blvd, Eugene, OR 97403.

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

RETAINER CONTRACTS EXCEEDING $100,000

INSTRUCTIONS TO BIDDERS

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INSTRUCTIONS TO BIDDERS

Oregon Administrative Rules Chapter 580, Divisions 61 and 63 govern this OUS procurement process.

Article 1. Scope of Work

The work contemplated under this contract with the Oregon State Board of Higher Education, hereinafter referred to as the Owner, includes all labor, materials, transportation, equipment and services necessary for, and reasonably incidental to, the completion of all construction work in connection with the project described in the Project Manual which includes, but is not necessarily limited to, the Advertisement for Bids, Instructions to Bidders, Supplemental Instructions to Bidders, Bid Form, Public Improvement Agreement Form, Performance Bond, Payment Bond, OUS General Conditions, Supplemental General Conditions, Plans and Specifications.

Article 2. Examination of Site and Conditions

Before making a bid, the bidder shall examine the site of the work and ascertain all the physical conditions in relation thereto. The bidder shall also make a careful examination of the Project Manual including the plans, specifications, and other contract documents, and shall be fully informed as to the quality and quantity of materials and the sources of supply of the materials. Failure to take these precautions will not release the successful bidder from entering into the contract nor excuse the bidder from performing the work in strict accordance with the terms of the contract.

The Owner will not be responsible for any loss or for any unanticipated costs which may be suffered by the successful bidder as a result of such bidder's failure to be fully informed in advance with regard to all conditions pertaining to the work and the character of the work required. No statement made by an officer, agent, or employee of the Owner in relation to the physical conditions pertaining to the site of the work will be binding on the Owner, unless covered by the Project Manual or an Addendum.

Article 3. Interpretation of Project Manual and Approval of Materials Equal to Those Provided in the Specifications

If any bidder contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the plans, specifications or forms of contract documents, or detects discrepancies or omissions, such bidder may submit to the Architect (read "Engineer" throughout as appropriate) a written request for an interpretation thereof at least 10 calendar days prior to the date set for the bid closing.

When a prospective bidder seeks approval of a particular manufacturer's material, process or item of equal value, utility or merit other than that designated by the Architect in the Project Manual, the bidder may submit to the Architect a written request for approval of such substitute at least 10 calendar days prior to the date set for the bid closing. The prospective bidder submitting the request will be responsible for its prompt delivery.

Requests of approval for a substitution from that specified 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.

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's name, brand or item designation is 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 in fact they do so or not.

Any interpretation of the Project Manual or approval of manufacturer's material will be made only by an Addendum duly issued. A copy of each Addendum will be mailed or delivered to each bidder receiving a Project Manual and becomes a part thereof. 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.

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 4. Execution of the Bid Form

Each bid shall be made in accordance with the sample Bid Form accompanying these instructions; In the case of a sole individual, the bid form need only be executed as principal by the sole individual. In the case of a partnership, the bid form must be executed by at least one of the partners. In the case of a corporation, the bid form must be executed by stating the official name of the corporation under which is placed the signature of an officer authorized to sign on behalf of the corporation followed by such person's official capacity, such as president, etc. This signature shall be attested by the secretary or assistant secretary of the corporation. The corporation seal should then be affixed to the bid form.; numbers pertaining to base bids shall be stated both in writing and in figures; the bidder's address shall be typed or printed.

The Bid Form relates to bids on a specific Project Manual. Only the amounts and information asked for on the Bid Form furnished will be considered as the bid. Each bidder shall bid upon the work exactly as specified and provided in the Bid Form. The bidder shall include in the bid a sum to cover the cost of all items contemplated by the Contract. The bidder shall bid upon all alternates that may be indicated on the Bid Form. 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."

The Bid Form included in the Project Manual is a sample. One additional copy of the Bid Form may be furnished with the Project Manual. One additional copy of the Bid Bond form may also be provided with the Project Manual. Only one copy needs to be submitted with the bid.

Article 5. Prohibition of Alterations to Bid

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

Article 6. Submission of Bid

Each bid shall be sealed in an envelope, properly addressed to the appropriate project Owner within the Oregon University System, 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 7. Bid Closing and Opening of Bids

All bids must be received by the Owner at the place and time set for the bid closing. Any bids received after the scheduled closing time for receipt of bids will be rejected and returned to the bidder unopened.

At the time of opening and reading of bids, each bid received will be publicly opened and read aloud, irrespective of any irregularities or informalities in such bids.

Article 8. Acceptance or Rejection of Bids by Owner

Unless all bids are rejected, the Owner will award a contract based on the lowest responsive bid from a responsible bidder. If that bidder does not execute the contract, it will be awarded to the next lowest responsible bidder or bidders in succession.

The Owner reserves the right to reject all bids and to waive minor informalities. The procedures for contract awards shall be in compliance with the provisions of Oregon Administrative Rules adopted by the Owner.

The Owner reserves the right to hold the bid and bid security of the three lowest bidders for a period of 30 calendar days from and after the time of bid opening pending award of the contract.

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.

If such bid has not been accepted within 30 calendar days after the opening of the bids, each of the three lowest bidders may withdraw the bid submitted.

Article 9. Withdrawal of Bid

At any time prior to the time and place set for the bid closing, a bidder may withdraw the bid. This will not preclude the submission of another bid by such bidder prior to the time set for the bid closing.

After the time set for the bid closing, no bidder will be permitted to withdraw its bid within the time frames specified in Article 8 for award and execution, except as provided for in that Article.

Article 10. Execution of Contract, Agreement, Performance Bond and Payment Bond

The Owner will provide the successful bidder with contract forms within 10 calendar days after the award of the Contract. The bidder is required to execute the contract forms 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 forms shall be delivered to the Owner in the number called for and to the location as noted in the Notice of Award.

Article 11. Recyclable Products

Contractors will use recyclable products to the maximum extent economically feasible in the performance of the Contract.

OREGON UNIVERSITY SYSTEM

STANDARD PUBLIC IMPROVEMENT CONTRACT

SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

Project Name University of Oregon, Health and Counseling Center
HVAC System Replacement

The following modify the Oregon University System "Instructions to Bidders" for this procurement. Where a portion of the Instructions to Bidders has been modified by these Supplemental Instructions to Bidders, the unaltered portions shall remain in effect.

RESERVED

OREGON UNIVERSITY SYSTEM

RETAINER CONTRACT

BID FORM

OUS CAMPUS: University of Oregon

PROJECT: Health and Counseling Center HVAC System Replacement

BID CLOSING: Friday, March 9th, 2012 at 2:00 at 4 PM

FROM: _____
Name of Contractor

TO: Oregon State Board of Higher Education
University of Oregon – Capital Construction Office
1295 Franklin Blvd.
1-541-346-8292

1. The Undersigned (*check one of the following and insert information 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 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 the following documents:

- NOPI – Contract Opportunity
- OUS Retainer Supplement Form
- OUS General Conditions
- Prevailing Wage Rates
- Plans and Specifications
- Instructions to Bidders
- Performance Bond and Payment Bond
- Supplemental General Conditions
- Payroll and Certified Statement Form
- Drawings and Details

- ADDENDA numbered ____ through____, inclusive *(fill in blanks)*

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

3. The Undersigned agrees, if awarded the Contract, to execute and deliver to the Oregon State Board of Higher Education, within twenty (20) calendar days after receiving the Contract forms, 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.

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 or its surety 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 make 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.
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 *****

OUS RETAINER CONTRACT SUPPLEMENT
PURSUANT TO OUS RETAINER CONTRACT FOR CONSTRUCTION RELATED SERVICES

Supplement No.:
Project Name:

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

the "Contractor":

Federal Tax ID No::

and the "Owner": The State of Oregon acting by and through the State Board of Higher Education on behalf of:
University of Oregon
Capital Construction
1295 Franklin Blvd
Eugene, OR 97403

(collectively the "Parties") pursuant to that certain Retainer Contract between the Parties dated July 1, 2010 (the "Retainer Contract"). For good and valuable consideration, the Parties agree as follows:

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

2. WORK TO BE PERFORMED. The Contractor will perform the following Work on the Project: _____ (the "Work"). The Contractor will perform the Work according to the terms and conditions of this Supplement and the Retainer Contract, including its attachments, which are incorporated into this Supplement by reference.

3. SCHEDULE. The Contractor will perform the Work according to the following schedule: use next

4. COMPENSATION. The Owner will compensate the Contractor for Work in the firm, fixed-price amount of $_____ in accordance with the requirements of the OUS General Conditions.

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 required approvals have been obtained (the "Effective Date"). No Work will be performed or payment made prior to the Effective Date. The Contractor will perform its

obligations according to this Supplement, unless terminated or suspended. Termination or suspension does not extinguish or prejudice Owner's right to enforce this Supplement with respect to any breach of Contractor's performance that has not been cured.

6. PERFORMANCE AND PAYMENT BONDS. The performance and payment bond requirements for this Project are as follows:

☐ Prior to execution of a Retainer Contract Supplement Notice to Proceed, Contractor must provide to the contracts officer of the Owner institution at which the Work will take place, a performance bond in a sum equal to the fixed price stated in paragraph 4(a) above, or the maximum not-to-exceed price stated in paragraph 4(b) above, as applicable, and a separate payment bond in the same amount.

☐ 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.** If the amount of 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 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, _____, 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 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 401.792 to 401.816 and ORS chapters 118, 314, 316, 317, 318, 320, 321 and 323; the elderly rental assistance program under ORS 310.630 to 310.706; and local taxes administered by the Department of Revenue under ORS 305.620.

9. INSURANCE REQUIREMENTS. Contractor shall comply with and obtain the insurance coverage amounts stated in the OUS General Conditions. If a different insurance type or level of coverage is required, it is identified in Supplemental General Conditions.

10. KEY PERSONS.

The Contractor's personnel identified below shall be considered Key Persons and shall not be replaced during the Project without the written permission of Owner, which shall not be

unreasonably withheld. If the Contractor intends to substitute personnel, a request must be given to Owner at least 30 days prior to the intended time of substitution. When replacements have been approved by Owner, the 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. Once a replacement for any of these staff members is authorized, further replacement shall not occur without the written permission of Owner. The Contractor's Project Staff shall consist of the following personnel:

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

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

Print Name: _____

Signature: _____

Title: _____

Date: _____

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

Print Name: _____

Signature: _____

Title: _____

Date: _____

OREGON UNIVERSITY SYSTEM

GENERAL CONDITIONS
FOR PUBLIC IMPROVEMENT CONTRACTS

February 1, 2011

INSTRUCTIONS: The attached **Oregon University System General Conditions for Public Improvement Contracts ("OUS General Conditions")** apply to all designated public improvement contracts. Changes to the OUS General Conditions (including any additions, deletions or substitutions) should only be made by attaching Supplemental General Conditions. The text of these OUS General Conditions should not otherwise be altered. These OUS General Conditions have been reviewed as to form by the Oregon Department of Justice. The legal sufficiency and approval requirements of ORS 291.047 remain applicable to individual OUS procurements, unless an exemption has been granted pursuant to that statute and Department of Justice administrative rules at OAR Chapter 137, Division 45.

TABLE OF SECTIONS

OREGON UNIVERSITY SYSTEM
GENERAL CONDITIONS FOR PUBLIC IMPROVEMENT CONTRACTS
("OUS General Conditions")

SECTION A
GENERAL PROVISIONS

A.1 DEFINITION OF TERMS

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

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 of the Owner's Authorized Representative 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's Authorized Representative 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, including Owner's written change directives as well as changes reflected in a writing executed by the parties to this Contract and, if applicable, establishing a Contract Price or Contract Time adjustment for the changed Work.

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 General Conditions.

CONSTRUCTION CHANGE DIRECTIVE, means a written order by the Owner's Authorized Representative 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 Public Improvement Agreement Form, OUS General Conditions, Supplemental General Conditions, if any, the accepted Offer, Plans, Specifications, amendments, Change Orders and Construction Change Directives .

CONTRACT PERIOD, as set forth in the Contract Documents, means the total period of time beginning with the issuance of the 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 and Change Orders.

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, old age and unemployment insurance, and fringe benefits required by agreement or custom; worker's compensation insurance; project specific insurance (including, witout limitation, Builder's Risk Insurance and Builder's Risk Installation Floater); bond premiums, rental cost of equipment, and machinery required for execution of the work; and the additional costs of field personnel directly attributable to the Work.

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

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

MWESB REPORT, means an accurate report by the Contractor to the Owner identifying all Minority, Women and Emerging Small Business (MWESB) enterprises, as those terms are defined in ORS 200.005, receiving contracts throughout the course of the Work. An initial MWESB report is required (see Section E.2.9) and MWESB Reports are required annually (see Section E.2.9) and as a condition of final payment (see Section K.1). The initial report shall include the total number of contracts and subcontracts awarded to MWESB enterprises and the dollar value of their respective contracts and subcontracts. The annual reports shall include the total number of contracts and subcontracts awarded to MWESB enterprises, the dollar value of each, and the expenditure toward each contract and subcontract during the previous twelve (12) months. The final report shall include the total number of contracts and subcontracts awarded to MWESB enterprises and the dollar value of their respective contracts and subcontracts including all Change Orders 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 and a proposal in connection with a Request for Proposals.

OFFEROR, means a bidder in connection with Instructions to Bidders and 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 at the job site (e.g. job trailer) including expenses of personnel staffing the job site

office, 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'S AUTHORIZED REPRESENTATIVE, means those individuals identified in writing by the Owner to act on behalf of the Owner for this project. Owner may elect, by written notice to Contractor, to delegate certain duties of the Owner's Authorized Representative to more than one party, including without limitation, to an Architect/Engineer. However, nothing in these OUS 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 an 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.

PUNCHLIST, 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 to Owner, operational and maintenance manuals, shop drawings, Change Orders, Construction Change Directives, MWESB Reports, correspondence, certificate(s) of occupancy, and other documents listed in Subsection B.9.1 of these OUS 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 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's Authorized Representative. The decision of the Owner's Authorized Representative is final.

SUPPLEMENTAL GENERAL CONDITIONS, means those conditions that remove from, add to, or modify these OUS General Conditions. 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 amendments, Change Orders and Construction Change Directives, with those of later date having precedence over those of an earlier date;

(b) The Supplemental General Conditions;

(c) The OUS Public Improvement Agreement Form;

(d) The OUS 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, including Instructions to Offerors and Supplemental Instructions to Offerors, 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 or Owner's Authorized Representative'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 or Owner's Authorized Representative. Matters concerning and interpretation of requirements of, the Contract Documents will

be decided by the Owner's Authorized Representative, 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's Authorized Representative (or the Architect/Engineer) within any time limits agreed upon or otherwise with reasonable promptness. Interpretations and decisions of the Owner's Authorized Representative (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's Authorized Representative (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's Authorized Representative, including without limitation, any nonconformity with applicable laws, statutes, ordinances, building codes, rules and regulations.

A.4.4 If the Contractor believes that additional cost or Contract Time is involved because of clarifications or instructions issued by the Owner's Authorized Representative (or Architect/Engineer) in response to the Contractor's notices or requests for information, the Contractor must submit a written request to the Owner's Authorized Representative, 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's Authorized Representative 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's Authorized Representative will provide administration of 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's Authorized Representative will act on behalf of the Owner to the extent provided in the Contract Documents, unless modified in writing in accordance with other provisions of the Contract. In performing these tasks, the Owner's Authorized Representative may rely on the Architect/Engineer or other consultants to perform some or all of these tasks.

B.1.2 The Owner's Authorized Representative 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's Authorized Representative will not make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Owner's Authorized Representative 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 endeavor to communicate with each other through the Owner's Authorized Representative or designee 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's Authorized Representative.

B.1.4 Based upon the Architect/Engineer's evaluations of the Contractor's Application for Payment, or unless otherwise stipulated by the Owner's Authorized Representative, 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's Authorized Representative to determine if they conform to the Contract Documents. Inspection of the Work by the Owner's Authorized Representative 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's Authorized Representative 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's Authorized Representative and include the cost of the Samples in the Contract Price.

B.4 PERMITS

Contractor shall obtain and pay for all necessary permits and licenses, except for those specifically excluded in the 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. The Contractor shall pay all royalties and license fees. The Contractor shall defend all suits or claims for infringement of any patent or other proprietary rights and save harmless and blameless from loss, on account thereof, the State of Oregon, and its departments, divisions, members and employees.

B.5 COMPLIANCE WITH GOVERNMENT REGULATIONS

B.5.1 Contractor shall comply with all federal, state and local laws, codes, regulations and ordinances applicable 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 s 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 law, regulation, 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's Authorized Representative shall be confirmed in writing to the Contractor.

B.7 INSPECTION

B.7.1 Owner's Authorized Representative shall have access to the Work at all times.

B.7.2 Inspection of the Work will be made by the Owner's Authorized Representative at its discretion. The Owner's Authorized Representative 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's Authorized Representative, 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 laws, ordinances, rules, regulations 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's Authorized Representative timely notice of when and where tests and inspections are to be made so that the Owner's Authorized Representative 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's Authorized Representative.

B.7.4 As required by the Contract Documents, Work done or material used without inspection or testing by the Owner's Authorized Representative 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 sufficient notice to the Owner's Authorized Representative, 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's Authorized Representative, the uncovering and restoration will be paid for as a Change Order.

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 Authorized Representative'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 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's Authorized Representative.

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, Change Orders, 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's Authorized Representative 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 Contract is involved in litigation, Contractor shall retain all such records until all litigation is resolved. The Owner and/or its agents shall continue to be provided full access to the records during litigation.

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 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 will 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's Authorized Representative 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's Authorized Representative 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 will fully cooperate with any and all other contractors without additional cost to the Owner in the manner described in section B.13.

B.15 GOVERNING LAW

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

B.16 LITIGATION

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

B.17 ALLOWANCES

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

B.17.2 Unless otherwise provided in the Contract Documents:

(a) when finally reconciled, allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

(b) Contractor's costs for unloading and handling at the site, labor, installation costs, Overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Price but not in the allowances;

(c) whenever costs are more than or less than allowances, the Contract Price shall be adjusted accordingly by Change Order. The amount of the Change Order 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's Authorized Representative 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 Change Order 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's Authorized Representative.

B.19 SUBSTITUTIONS

The Contractor may make Substitutions only with the consent of the Owner, after evaluation by the Owner's Authorized Representative and only in accordance with a Change Order 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. Contractor shall pay workers at not less than the specified minimum hourly rate of wage, and shall include that requirement in all subcontracts.

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's Authorized Representative, 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 if 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 approval of the Owner's Authorized Representative, and then only in a manner consistent with the Change Order provisions of this Section D.1 and after any necessary approvals required by public contracting laws have been obtained. Otherwise, a formal contract 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's Authorized Representative may at any time, without notice to the sureties and without impairing the Contract, require changes consistent with this Section D.1. All Change Order Work 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 Change Order 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 additional Work, and a binding obligation exists under the Contract on the parties covering the terms and conditions of the additional 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 Change Order 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. The mark-ups set forth in D.1.3(c) shall be utilized by the parties as a guide in establishing fixed pricing, and will not be exceeded by Owner without adequate justification. Cost and price data relating to Change Orders 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 Change Order 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%

When Change Order Work under D.1.3(c) is 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 such Change Order 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 Change Order Work. Owner may establish a maximum cost for Change Order Work under this Section D.1.3(c), which shall not be exceeded for reimbursement without additional written authorization from Owner. Contractor shall not be required to complete such Change Order Work without additional authorization.

D.1.4 Any necessary adjustment of Contract Time that may be required as a result of a Change Order must be agreed upon by the parties before the start of the Change Order Work unless Owner's Authorized Representative authorizes Contractor to start the 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 the Change Order. 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 Change Order are 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's Authorized Representative 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 Change Order 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, the Contractor must submit a written request to the Owner's Authorized Representative, 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 the Change Order by Contractor.

The thirty (30) Day time limit applies to claims of Subcontractors, suppliers, or manufacturers who may be affected by the Change Order 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 compensation and additional Contract Time requested. The Contractor will 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 additional compensation or Contract Time that Contractor submits to the Owner's Authorized Representative. Failure of Subcontractors, suppliers, manufacturers or others to submit their requests to Contractor for inclusion with Contractor's requests submitted to Owner's Authorized Representative within the time period and by the means described in this section shall constitute a waiver of these Subcontractor claims. The Owner's Authorized Representative and 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 the State of Oregon, whether in this claims process, in litigation, or in any dispute resolution process.

If the Owner's Authorized Representative denies the Contractor's request for additional compensation or an extension of 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 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) Caused by any actions of the Owner, Owner's Authorized Representative, or any other employee or agent of the Owner, or by separate contractor employed by the Owner.

(b) 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's Authorized Representative immediately of differing site conditions before the area has been disturbed. The Owner's Authorized Representative 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's Authorized Representative agree that a differing site condition exists, any additional compensation or additional Contract Time will be determined based on the process set forth in Section D.1.5 for Change Order Work. If the Owner's Authorized Representative 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) 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) 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's Authorized Representative 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's Authorized Representative, a complete and detailed request for additional compensation or additional Contract Time, or both, as applicable, resulting from the delay.

If the Owner's Authorized Representative 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's Authorized Representative for review. Contractor's Claims, including Claims for additional compensation or additional Contract Time, shall be submitted in writing by Contractor to the Owner's Authorized Representative 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 General Conditions. Within thirty (30) Days after the initial Claim, Contractor shall submit to the Owner's Authorized Representative 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.

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 extension 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's Authorized Representative. The Owner's Authorized Representative and 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's Authorized Representative 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 Authorized Representative'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 parties agree to promptly submit the appropriate motions and orders documenting the settlement to the Court for its signature and filing.

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 Owner may at any time and at its discretion issue a Construction Change Directive adding to, modifying or reducing the scope of Work. Contractor and Owner shall negotiate the need for any adjustment to compensation or additional Contract Time related to the change, subject to the procedures for submitting requests or Claims for additional compensation or additional Contract Time established in this Section D. Unless otherwise directed by Owner's Authorized Representative, Contractor shall proceed with the Work while any request or Claim for additional compensation or additional Contract Time resulting from Work under a Change Order or Construction Change Directive is pending. Regardless of the review period or the final decision of the Owner's Authorized Representative, 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 Work without a written stop work order from the Owner or Owner's Authorized Representative.

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 will provide a breakdown of values for the contracted Work and will be the basis for progress payments. The breakdown will demonstrate reasonable, identifiable, and measurable components of the Work.

Unless objected to by the Owner's Authorized Representative, this schedule shall be used as the basis for reviewing Contractor's applications for payment. If objected to by Owner's Authorized Representative, Contractor shall revise the schedule of values and resubmit the same for approval of Owner's Authorized Representative.

E.2 APPLICATIONS FOR PAYMENT

E.2.1 Owner shall make progress payments on the Contract monthly as Work progresses. Payments shall be based upon estimates of Work completed and the Schedule of Values. All payments shall be approved by the Owner's Authorized Representative. 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 over due claims at the rate of two-thirds of one percent per month on the progress payment, not including retainage, due the Contractor. Over due claims 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 of the initial billing statement if no invoice is received;

(c) The date all goods have been received; or

(d) The date the 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 payment that is 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 will be required to arrange for receipt of the EFT/ACH payments.

E.2.2 Contractor shall submit to the Owner's Authorized Representative 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: _____

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's Authorized Representative 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 only. The submitted amount of the application for payment shall be reduced by the cost of transportation and for the cost of an inspector to check the delivery at out of town storage sites. The cost of said 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 stored.

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

(h) All required documentation must 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 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 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 Change Order;

(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's Authorized Representative has withheld or nullified payment as provided in the Contract Documents.

E.2.6 Contractor's applications for payment may 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 labor, materials and equipment relating to the Work.

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

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

E.3 PAYROLL CERTIFICATION REQUIREMENT

Payroll certification is required before payments are made on the Contract. Refer to Section C.2 for this information.

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 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 opinion, 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 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 Owner shall, within fifteen (15) Days after receiving the written notice, either accept the Work or notify the Contractor of Work yet to be performed on the Contract. If Owner does not within the time allowed notify the Contractor of Work yet to be performed to

fulfill contractual obligations, the interest provided by this subsection shall commence to run forty five (45) Days after the end of the 15-Day period.

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

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.5.2 As provided in subsections C.2.2 and C.2.3, additional retainage in the amount of 25% of amounts earned shall be withheld and released in accordance with ORS 279C.845(7) when the Contractor fails to file certified statements as required by section C.2.1.

E.6 FINAL PAYMENT

E.6.1 Upon completion of all the Work under this Contract, the Contractor shall notify the Owner's Authorized Representative, in writing, that Contractor has completed Contractor's part of the Contract and shall request final payment. Upon receipt of such notice the Owner's Authorized Representative will inspect the Work, and if acceptable, submit to the Owner a recommendation as to acceptance of the completed Work and the final estimate of the amount due the Contractor. If the Work is not acceptable, Owner will notify Contractor within fifteen (15) Days of Contractor's request for final payment.. Upon approval of this final estimate by the Owner and compliance by the Contractor with provisions in Section K, AFFIDAVIT/RELEASE OF LIENS AND CLAIMS, and other provisions 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's Authorized Representative (1) a notarized affidavit/release of liens and claims in a form satisfactory to Owner that states that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) 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, (3) 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, (4) consent of surety, if any, to final payment and (5), 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, law, ordinances, permits or directions of the Owner's Authorized Representative. Contractor shall follow the Owner's Authorized Representative'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's Authorized Representative, 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 and shall comply with the Contract Documents and all applicable provisions of federal, state and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the Work is being performed. Contractor shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards for protection of workers and the public against any hazards created by construction. Contractor shall designate a responsible employee or associate on the Work site, whose duty shall be the prevention of accidents. The name and position of the person designated shall be reported to the Owner's Authorized Representative. The Owner's Authorized Representative has no responsibility for Work site safety. Work site safety is 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's Authorized Representative, all pertinent facts relating to such property damage and the ultimate disposition of the claim for damage.

F.2.4 Contractor is responsible for protection of adjacent work areas including impacts brought about by activities, equipment, labor, utilities, 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 will 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 of the Work or of adjoining property, the Contractor, without special instruction or authorization from the Owner's Authorized Representative, shall act reasonably to prevent threatened loss or injury, and shall so act, without appeal, if instructed by the Owner's Authorized Representative. 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 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 will 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 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 proper regulatory agencies in a manner that complies with applicable federal, state, and local laws and regulations. Cleanup shall be at no cost to the Owner and be performed by properly qualified 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 federal, state, or local statutes, rules or ordinances. Notwithstanding such written consent from the Owner, the Contractor, at all times, shall:

(a) properly handle, use and dispose or all environmental pollutants and hazardous substances or materials brought onto the Work site, in accordance with all applicable federal, state, or local statutes, rules, or ordinances;

(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, without cost to the Owner, such spills, releases, discharges, or leaks to the Owner's satisfaction and in compliance with all applicable federal, state, or local statutes, rules or ordinances.

F.5.2 Contractor shall report all reportable quantity releases to applicable federal, state, and local regulatory and emergency response agencies. Reportable quantities are found in 40 CFR Part 302, Table 302.4 for hazardous substances and in OAR 340-142-0050 for all products addressed therein. 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 no., and all other documentation required by law.)

(b) Whether amount of items released is EPA/DEQ reportable, and, if so, when it was 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 Contractor has had with members of the press or State officials other than Owner.

(f) Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.

(g) Personnel 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 in 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.

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, personnel, or 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, Owner's Authorized Representative, 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.1.2, (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 this 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. The bonds may be required if the Contract Price is less than the above thresholds if 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 the Subcontractor to start Work.

G.3 INSURANCE

G.3.1 Primary Coverage: Insurance carried by Contractor under this Contract shall be the primary coverage, and the Owner's insurance is excess and solely for damages or losses for which the Owner is responsible. 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 $100,000 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 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 form, including earthquake and flood, for an amount equal to the full amount of the Contract. Any deductible shall not exceed $50,000 for each loss, except the earthquake and flood deductible shall not exceed 2 percent of each loss or $50,000, whichever is more. The policy will include as loss payees the Owner, the Contractor and its Subcontractors as their interests may appear.

G.3.3.2 Builder's Risk Installation Floater: For other than new construction the 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. This insurance shall include as loss payees the State of Oregon, the Owner, the Contractor and its Subcontractors as their interests may appear.

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 for the insureds, as their interests may appear. 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 Liability Insurance:

G.3.4.1 Commercial General Liability: Contractor shall obtain, at Contractor's expense, and keep in effect during the term of this Contract, Commercial General Liability Insurance covering bodily injury and property damage in a form and with coverages that are satisfactory to the State. This insurance shall include personal injury liability, products and completed operations, and contractual liability coverage for the indemnity 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. Contractor shall provide proof of insurance of not less than the following amounts:

Bodily Injury/Death:

Amounts not less than the amounts listed in the following schedule:

Per occurrence limit for any single claimant :

From commencement of the Contract term to June 30, 2011:	$1,600,000
July 1, 2011 to June 30, 2012:	$1,700,000
July 1, 2012 to June 30, 2013:	$1,800,000
July 1, 2013 to June 30, 2014:	$1,900,000
July 1, 2014 to June 30, 2015:	$2,000,000

July 1, 2015 and thereafter the adjusted limitation as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 3 (Senate Bill 311).

Per occurrence limit for any number of claimants:

From commencement of the Contract term to June 30, 2011:	$3,200,000
July 1, 2011 to June 30, 2012:	$3,400,000
July 1, 2012 to June 30, 2013:	$3,600,000
July 1, 2013 to June 30, 2014:	$3,800,000
July 1, 2014 to June 30, 2015:	$4,000,000

July 1, 2015 and thereafter the adjusted limitation as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 3 (Senate Bill 311).

Property Damage:

Amounts not less than the amounts listed in the following schedule:

Per occurrence limit for any single claimant:

From commencement of the Contract term to June 30, 2011: $100,100.

Effective as of July 1 of each year the adjusted limitation will be as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 5 (Senate Bill 311).

Per occurrence limit for any number of claimants:

From commencement of the Contract term to June 30, 2011: $500,600.

Effective as of July 1 of each year the adjusted limitation will be as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 5 (Senate Bill 311).

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, non-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 the following amounts:

Bodily Injury/Death:

Amounts not less than the amounts listed in the following schedule:

Per occurrence limit for any single claimant:

From commencement of the Contract term to June 30, 2011:	$1,600,000.
July 1, 2011 to June 30, 2012:	$1,700,000.
July 1, 2012 to June 30, 2013:	$1,800,000.
July 1, 2013 to June 30, 2014:	$1,900,000.
July 1, 2014 to June 30, 2015:	$2,000,000.

July 1, 2015 and thereafter the adjusted limitation as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 3 (Senate Bill 311).

Per occurrence limit for any number of claimants:

From commencement of the Contract term to June 30, 2011:	$3,200,000.
July 1, 2011 to June 30, 2012:	$3,400,000.
July 1, 2012 to June 30, 2013:	$3,600,000.
July 1, 2013 to June 30, 2014:	$3,800,000.
July 1, 2014 to June 30, 2015:	$4,000,000.

July 1, 2015 and thereafter the adjusted limitation as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 3 (Senate Bill 311).

Property Damage:

Amounts not less than the amounts listed in the following schedule:

Per occurrence limit for any single claimant:

From commencement of the Contract term to June 30, 2011: $100,100.

Effective as of July 1 of each year the adjusted limitation will be as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 5 (Senate Bill 311).

Per occurrence limit for any number of claimants:

From commencement of the Contract term to June 30, 2011: $500,600.

Effective as of July 1 of each year the adjusted limitation will be as determined by the State Court Administrator pursuant to Oregon Laws 2009, chapter 67, section 5 (Senate Bill 311).

G.3.4.3 "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 24 months or the maximum time period available in the marketplace if less than 24 months. Contractor will be responsible for furnishing certification of "tail" coverage as described or continuous "claims made" liability coverage for 24 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. This will be a condition of the final acceptance of Work or services and related warranty (if any).

G.3.5 Additional Insured: The liability insurance coverage, except Professional Liability if included, required for performance of

this Contract shall include the State of Oregon, its departments, divisions, officers, and employees, 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 State of Oregon, its departments, divisions, officers and employees 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 State of Oregon, its departments, divisions, officers and employees as Named Insureds with not less than a $1,500,000.00 limit per occurrence. This policy must be kept in effect for 12 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: There shall be no cancellation, material change, potential exhaustion of aggregate limits or intent not to renew insurance coverages without thirty (30) Days' written notice from the Contractor or its insurer(s) to the Owner. 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 State of Oregon, its Owner and their divisions, officers, and employees.

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. Insurance coverage required under this Contract shall be obtained from insurance companies or entities acceptable to the Owner that are allowed 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 do an insurance business in the state of Oregon, and certain non-admitted surplus lines insurers that satisfy the requirements of applicable Oregon law and are approved by the Owner. The certificates will also specify that there shall be no cancellation, material change, potential exhaustion of aggregate limits or intent not to renew insurance coverages without thirty (30) Days' written notice from the insurer(s) to the Owner. To the extent Certificates of Insurance contain words to the effect that Contractor shall "endeavor to send notice of cancellation" or similar language, Contractor shall require its insurer to send such notice by making sure that the words “endeavor to” or similar words are removed from the Certificate. 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 approved by the Owner in writing prior to execution of the Contract and is subject to Owner's approval.

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 on this Contract. The Contractor shall at all times carry on the Work diligently, without delay and punctually fulfill all requirements herein. 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 Change Order, 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 Change Order process 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, a detailed schedule for review and acceptance by the Owner. The submitted schedule must illustrate Work by significant project components, significant labor trades, and long lead items broken down by building and/or floor where applicable. Each schedule item shall account for no greater than 5 % of the monetary value of the project or 5 % of the available Contract Time. Schedules with activities of less than one Day or valued at less than 1% of the Contract will be considered too detailed and will not be accepted. Schedules lacking adequate detail, or unreasonably detailed, will be rejected. Included within the schedule are the following: Notice to Proceed, Substantial Completion, and Final Completion. Schedules will be updated monthly and submitted with the monthly payment application. 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's Authorized Representative, 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 This provision does not 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 affected Work has been accepted in writing by the Owner's Authorized Representative.

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 and/or the Owner's Authorized Representative 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's Authorized Representative, which are unsuitable for performing the Work;

(e) Time required to investigate differing site conditions;

(f) Any reason considered to be in the public interest.

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

J.2 CONTRACTOR'S RESPONSIBILITIES

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

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

J.3 COMPENSATION FOR SUSPENSION

J.3.1 Depending on the reason for suspension of the Work, the Contractor or the Owner may be due compensation by the other party. If the suspension was required due to acts or omissions of Contractor, the Owner may assess the Contractor actual costs of the suspension in terms of administration, remedial work by the Owner's forces or another contractor to correct the problem associated with the suspension, rent of temporary facilities, and other actual costs related to the suspension. If the suspension was caused by acts or omissions of the Owner, the Contractor shall 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 owes 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 its Authorized Representative; or

(f) If Contractor is otherwise in material breach of any part of the Contract.

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 the public.

J.5.2 The Owner will provide the Contractor with seven (7) Days prior written notice of a termination 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.

SECTION K
CONTRACT CLOSE OUT

K.1 RECORD DOCUMENTS

As a condition of final payment (refer also to section E.6), Contractor shall comply with the following: Contractor shall provide Record Documents for the entire project to Owner's Authorized Representative. 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's Authorized Representative prior to submission of any pay request for more than 75% of the Work. No payments beyond 75% will be made by the Owner until the 0 & M Manuals have been received. The O & M Manuals shall contain a complete set of all submittals, all product data as required by the specifications, training information, phone list of 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's Authorized Representative shall review and return one O & M Manual for any modifications or additions 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's Authorized Representative.

K.3 AFFIDAVIT/RELEASE OF LIENS AND CLAIMS

As a condition of final payment, the Contractor shall submit to the Owner's Authorized Representative a notarized affidavit/release of liens and claims form in a form satisfactory to Owner, which states that all Subcontractors and suppliers have been paid in full, all disputes with property owners have been resolved, all obligations on the project have been satisfied, all monetary claims and indebtedness have been paid, and that, to the best of the Contractor's knowledge, there are no claims of any kind outstanding against the project. The Contractor shall indemnify, defend (with counsel of Owner's choice) and hold harmless the Owner from all claims for labor and materials finished under this Contract. The Contractor shall furnish complete and valid releases or waivers, satisfactory to the Owner, of all liens arising out of or filed in connection with the Work.

K.4 COMPLETION NOTICES

K.4.1 Contractor shall provide Owner 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 punchlist accompanying the Certificate. Both completion notices must be signed by the Contractor and the Owner to be valid. The Owner shall provide the final signature on the notices. The notices shall take effect on the date they are signed by the Owner.

K.4.2 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's Authorized Representative. 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's Authorized Representative with submission of the request for the Substantial Completion notice.

K.5 TRAINING

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

K.6 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 specifications prior to final payment. Delivery point for extra materials shall be designated by the Owner's Authorized Representative.

K.7 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 pollution clean-up performed as a part of this Contract has been disposed of in accordance with all applicable rules, regulations, laws, and statutes of all agencies having jurisdiction over such environmental pollution. The notice shall reaffirm the indemnification given under Section F.5.1 above.

K.8 CERTIFICATE OF OCCUPANCY

The Contractor shall not be granted Final Completion or receive final payment if the Owner has not received an unconditioned certificate of occupancy from the appropriate state and/or local building officials, unless failure to obtain an unconditional certificate of occupancy is due to the fault or neglect of Owner.

K.9 OTHER CONTRACTOR RESPONSIBILITIES

The Contractor shall be responsible for returning to the Owner all items issued during construction such as keys, security passes, site admittance badges, and all other pertinent items. The 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.10 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.

PREVAILING WAGE RATES

In compliance with Oregon Prevailing Wage Law, the following is incorporated into this invitation to Bid:

> The Prevailing Wage Rates dated January 1, 2012, including any subsequent corrections or amendments issued by the Oregon Bureau of Labor and Industries, are included as a portion of the Contract Documents by reference. Copes can be viewed on line at www.boli.state.or.us. Click on Prevailing Wages, then PWR Rate Publications, and then Prevailing Wage Rates for Public Works Contracts in Oregon (subject only to state law).

END OF DOCUMENT

PREVAILING WAGE RATES

for

Public Works Contracts in Oregon

BOLI

OREGON BUREAU OF LABOR AND INDUSTRIES

Brad Avakian
Commissioner
Bureau of Labor and Industries

Effective: January 1, 2012

http://www.oregon.gov/BOLI/PWR/pwr_state.shtml

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, Oregon State Board of Higher Education (OSBHE), 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 State of Oregon, 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 State of Oregon, OSBHE, 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 above-referenced agency(ies), 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, Oregon State Board of Higher Education (OSBHE), 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 State of Oregon, 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 State of Oregon, OSBHE 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 above-referenced agency(ies), 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

SECTION 01 10 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Work covered by Contract Documents.

B. Contract method.

C. Contractor use of premises.

D. Owner occupancy.

E. Related work under separate Contract.

F. Work by Owner.

G. Equipment furnished by Owner and installed hereunder.

H. Equipment furnished under separate Contract and installed hereunder.

I. Sequence of work.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Furnish and install all necessary equipment and materials to provide fully operational systems as specified, described, shown, and intended herein. Work shall include all provisions recommended by manufacturers of equipment installed hereunder including miscellaneous support equipment, installation, start-up, testing, and operation. This specification represents minimum requirements and is not intended to restrict the contractor from providing additional functions, options or enhancements if contractor so desires.

B. Overall Project Description: Provide new heating, ventilating, and air-conditioning systems to serve the northeast wing of the University of Oregon Health Services Building. Specific work will include but is not limited to the following:

1. Install Owner-provided air handling system units to serve the northeast wing..
2. Reconfigure and add ductwork in the northeast wing and provide chilled beam terminal equipment in areas served.
3. Provide new hydronic piping and pumps.
4. Reconfigure and expand existing control systems to serve new equipment.
5. Provide electrical service to new equipment.

1.03 CONTRACT METHOD

A. Work will be constructed under a single lump sum contract.

1.04 CONTRACT TIME

A. Do not commence work until after execution of the agreement and receipt of notice to proceed from Owner.

B. Perform work so as to achieve substantial completion of the northeast wing second floor by July 27, 2012. Work must include all support systems required to allow the area to operate in accordance with the design intent including new pumps, piping from the existing basement mechanical room, electrical work, and control upgrades.

C. Perform work so as to achieve substantial completion of the remaining project by August 10, 2012.

D. The project shall be finally complete no later than September 7, 2012.

1.05 CONTRACTOR USE OF PREMISES

A. Contractor shall limit use of premises for work, for storage, and for access to allow:
   1. Owner occupancy in adjacent spaces.
   2. Public usage in adjacent spaces.
   3. Work by other contractors.

B. Coordinate use of premises under the direction of the Owner.

C. Assume full responsibility for protection and safekeeping of products under this Contract.

D. Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.06 OWNER OCCUPANCY

A. Areas near and adjacent to work under this Contract are currently occupied. Owner will occupy premises during the entire construction period for performance of normal operations. Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

B. Public will have access to areas adjacent to the work area covered by this Contract. It is the responsibility of the Contractor to put up barricades and warning signs to adequately protect the public or any Owner's representative from being exposed to an unsafe condition while the Contractor is performing the work.

1.07 RELATED WORK UNDER SEPARATE CONTRACT

A. Under separate contract, a new storefront door and window system will be installed in Lobby Room L140 during the spring break period (March 23, 2012 at 5:00 PM through April 1, 2012). Contractor shall coordinate work hereunder with new door window system.

B. Work under both contracts will be performed simultaneously and will be managed by the Owner as one project. Contractor shall coordinate work under this Contract with storefront system Contractor to ensure that all work under both contracts is complete and fully operational within the time specified. Specific coordination issues will include but will not be limited to:
   1. Project scheduling.
   2. Project meetings.
   3. Coordination of related work.
   4. Access.

C. Issues identified as the result of coordinating work with the storefront Contractor which affect the schedule of work shall immediately be brought to the attention of the Project Manager.

1.08 WORK BY OWNER

A. Owner will furnish air handling unit AHU-3 and active chilled beams for the project. Delivery and storage requirements are discussed under individual specification sections.

B. Owner will move staff, equipment, and materials necessary for normal conduct of business. The Owner will be responsible for repair of any damage caused by moving staff, equipment, or materials.

1.09 SEQUENCE OF WORK

A. The facility will be occupied during portions of the construction period for conduct of normal operations. Construction shall be sequenced to minimize disruption and reduce the downtime of related mechanical and electrical systems. See Section 01 35 00 – SPECIAL PROCEDURES for a more detailed description of Contractor access and coordination requirements.

B. An approved phasing sequence is described below. Contractor may adjust the phasing sequence and the work included in each phase after review and approval of the Owner.

Northeast Wing

1. Phase 3 - Start of Contract through March 23, 2012: Owner will fully occupy all areas of the building during normal occupied hours. Contractor may have access during unoccupied hours or weekends to perform planning and preparation for spring break work.
2. Phase 3 – March 23, 2012 at 5:00 PM through April 1, 2012 (Spring Break): Contractor may have access to all portions of the first floor of the northeast wing and the east fan room on the second floor of the northeast wing 24 hours/day, 7 days per week. Work during this period shall include:
   a. Lobby Room L140.
      - Remove and replace existing ceiling.
      - Install Owner-furnished chilled beams.
      - Provide supply ductwork from chilled beams terminating in hallway AH101 for connection under future phase.
      - Provide new heating and chilled water piping routed north-south through L140. Terminate in accessible ceiling spaces for connection under future phase.
      - Provide new chilled beam runout piping and hydronic trim.
      - Provide new control valve, space sensor, control wiring, and related control components needed to serve room AH101.
      - Provide new lighting and associated electrical work.
   b. East Second Floor Mechanical Room A214: At Contractor's discretion, existing exhaust fan EF-11 and associated structural support and electrical service connection can be removed and new AHU-3 can be installed. At completion of phase 3, existing exhaust fan EF-15 must remain operational to provide ventilation for the first floor until June 18.
3. Phase 4 – April 2, 2012 through June 17, 2012: Owner will fully occupy all areas of the building during normal occupied hours. Contractor may have access during unoccupied hours or weekends to perform planning and preparation for Phase 4.
4. Phase 4 –June 18 through September 7:
   a. Second Floor: The second floor will be available 24 hours/day, 7 days per week through July 27. All work in the area must be substantially complete on July 27,

2012 allowing normal Owner occupancy for the following week. Any remaining work required before final completion must be performed during unoccupied hours or on weekends. Contractor shall supply detailed work plan and schedule for this area so the Owner may have the opportunity to access office areas when work is not underway.

b. First Floor and Basement Mechanical Room: The first floor and basement mechanical room will be available 24 hours/day, 7 days per week. All work must be substantially complete by August 10.
c. Entire project finally complete on or before September 7, 2012.

Remaining Building

1. Phase 3 and 4:
   a. Owner Occupied Areas: All areas outside of the northeast wing will remain occupied through the entire project. All work in these spaces with the exception of within the basement mechanical room must be performed during unoccupied hours or on weekends.
   b. Basement Mechanical Room: Work in the basement mechanical room may be performed at any time subject to noise, dust, and odor control requirements.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDED

A. Requirements and procedures associated with product substitutions after bid date.

1.02 ALLOWANCE OF SUBSTITUTIONS

A. After effective date of Agreement, the Engineer in consultation with the Owner may, at its option, consider formal requests from the Contractor for substitution of products in place of those specified when submitted in accordance with the requirements of this section. One or more of the following conditions must also be documented:
   1. The substitution must be required for compliance with final interpretation of code requirements or insurance regulations.
   2. The substitution must be due to the unavailability of the specified product(s), through no fault of the Contractor.
   3. The substitution may be requested when specified products cannot be obtained in time to avoid delay of completion of all work due to no fault of the Contractor, and then only if a request is submitted within 30 days of the start of Contract Time.
   4. The substitution may be requested when subsequent information discloses the inability of the specified product(s) to perform properly or to fit in the designated space.
   5. The substitution may be due to the manufacturer's or fabricator's refusal to certify or guarantee performance of the specified product as required.
   6. The substitution may be requested when it is clearly seen, in the judgment of the Owner, that a substitution would be substantially to the Owner's best interest in terms of cost, time or other considerations.

1.03 SUBSTITUTION REQUESTS

A. Prepare one (1) request for each substitution item proposed for consideration. Requests will not be accepted from anyone other than Contractor.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Minimum information to be all manufacturers product data as defined in Section 01 33 00, paragraph 1.04C, or same information provided as submittal requirements of like products if it exceeds minimum. All variations of the proposed substitute and other related work from that specified will be identified in the request and available maintenance, repair and replacement service will be indicated. Engineer may require Contractor to furnish, at Contractor's expense, additional data about the proposed substitute.

C. Request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds, in all respects, the specified product quality and will perform the functions and achieve the results called for by the design.
   2. Shall provide the same warranty for substitutions as for specified product.
   3. Shall coordinate installation and make all other changes which may be required for work to be complete in all respects, including changes required by suppliers, subcontractors, and others providing related work.
   4. Shall complete the work within the Contract time.

D. Each request will contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by Engineer in evaluating the proposed substitute.

E. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without separate written request.

1.04 APPROVAL OF SUBSTITUTION REQUEST

A. Within seven (7) days of receiving a complete substitution request, Engineer in consultation with Owner will evaluate the request and notify the Contractor of its acceptance or not.

B. Engineer after consultation with Owner shall be the sole judge of acceptability and decision of Engineer shall be final.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED.

PART 3 - EXECUTION

3.01 THIS PART NOT USED.

END OF SECTION

SECTION 01 26 00

CONTRACT CLARIFICATION AND MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requests for Information

B. Proposals for changes in work.

C. Field Orders

D. Change Orders

E. Construction Change Directives.

1.02 DEFINITIONS

A. Requests for Information (RFIs): Contractor request for interpretations of the Contract Documents.

B. Field Order: Written order, instruction, or project manual interpretation issued by Engineer to Contractor which authorizes minor changes to Work which do not alter Contract Sum or Contract Time.

B. Change Order: As defined in the General Conditions and signed by Owner, Contractor, and Engineer.

C. Construction Change Directive: Written order to Contractor signed by Owner, Contractor, and Engineer which authorizes changes in the Work which affect the Contract Sum or Contract Time. A Construction Change Directive will be issued involving changes in the Work which, if not processed quickly, might delay the project. A Construction Change Directive will be followed by a Change Order.

1.03 REQUESTS FOR INFORMATION

A. All questions requiring a clarification of the contract drawings or specifications shall be provided by e-mail or in writing to the Engineer from the Contractor in the form of a Request for Information (RFI). All other verbal communication or correspondence regarding contract drawings or specifications shall not be considered binding.

B. Engineer will respond within five (5) days of receipt of the RFI

C. Format
1. RFI may be delivered either as hard copy or by e-mail.
2. RFI provided in Contractor format but will include as a minimum.
   a. Name of Company
   b. Name of Project
   c. Name of person initiating the RFI
   d. RFI number.
   e. Date Issued
   f. Detailed question that references specific drawing or specification section in question.

g. Contractor's recommended solution if appropriate.
h. Space for the Engineer to respond.
i. Potential Impact on Project Sum.
j. Potential Impact on Project Time.

1.04 PROPOSALS FOR CHANGE IN WORK

A. Proposals for changes to the Work may be initiated by the Owner or Engineer or by the Contractor. The proposals will result in a Field Order or Change Order if a Change in Work is found to be necessary. Proposals are for information only and are not an instruction or authorization to execute the change or an order to stop work in progress.

B. Owner or Engineer Initiated Proposals: Contractor shall provide sufficient substantiating data to allow the Engineer to evaluate the proposal including the following:
1. Cost data for new work including:
   a. Labor required.
   b. Materials required.
   c. Taxes, insurance, and bonds.
   d. Overhead and profit.
2. Cost data for work to be deleted including:
   a. Labor required.
   b. Materials required.
   c. Taxes, insurance, and bonds.
   d. Overhead and profit.
3. Changes to contract time:
   a. New project staging requirements.
   b. New product delivery times.
4. All other justifying documentation considered necessary by Engineer to allow adequate evaluation of proposal.

C. Contractor Initiated Proposals: In addition to proposal requirements listed in 01 26 00-1.04B, provide the following information:
1. Description of proposal change.
2. Reason for making change.
3. Effect on work of other Contractors.
4. Effect on work by Owner.
5. Effect on construction phasing.

1.05 FIELD ORDER

A. If evaluation of a proposal indicates that a Construction Change is appropriate but does not affect Contract Sum or Contract Time, Engineer will issue a Field Order. The Contractor shall distribute a copy of the Field Order to the appropriate sub-contractors and shall coordinate all associated work.

B. Format: Field Orders will be issued on form provided by Engineer.

1.06 CHANGE ORDERS

A. Format: Change Orders will be issued on form provided by Engineer.

B. If evaluation of a proposal indicates that a Construction Change is appropriate and that the change affects the Contract Sum or Contract Time, a Change Order will be issued.

C. Four copies of the Change Order will be prepared by the Engineer and forwarded to the Contractor.

D. An authorized representative of the Contractor will sign each copy and return all copies to the Engineer.

E. The Engineer will review and sign each copy and forward all copies to the Owner.

F. An authorized representative of the Owner will sign each copy and return two copies to the Engineer.

G. The Engineer will return one copy to the Contractor.

1.07 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directives (CCDs) will be issued on form provided by Engineer.

B. If a Construction Change is identified which must be processed quickly to avoid delay of the project, a Construction Change Directive may be issued.

C. The Construction Change Directive will include:
1. The method of determining the Change in Contract Sum.
2. An estimated increase (decrease) in Contract Sum.
3. The method of determining the Change in Contract Time.
4. An estimated increase (decrease) in Contract Time.

D. The Construction Change Directive will be signed by the Owner and will serve as authorization to proceed with the described change in work.

E. If the change in work involves an increase in Contract Sum and the estimated increase is approached before the additional or changed work is complete, the Contractor must stop work associated with the change until an additional Construction Change Directive or Change Order is issued.

F. Simultaneously to completing work under a Construction Change Directive, the Contractor shall prepare a proposal as previously described detailing the exact change in Contract Sum and Contract Time associated with the work in question. The proposal will be reviewed by the Engineer and Owner, and a Change Order will be issued if the changes in Contract Sum and Contract Time are agreeable.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED.

PART 3 - EXECUTION

3.01 CHANGES TO WORK

A. Contractor shall not begin any work not expressly shown or described in the Contract Documents without a written Field Order, Change Order, or Construction Change Directive.

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. General Conditions.

B. Supplementary Conditions.

1.02 FORMAT

A. AIA G702 - Application and Certificate for Payment.

B. AIA G703 - Continuation Sheet.

C. Payment request is to include the Contractor's Federal Tax Identification number.

1.03 PREPARATION OF APPLICATIONS

A. Type required information or use media-driven printout.

B. Execute certification by signature of authorized officer and notarize.

C. Use data on accepted Schedule of Values. Provide dollar value in each column for each line item for materials installed. Application for payment for stored materials will be accepted at Owner’s sole discretion subject to conditions stated in General Conditions.

D. List each approved Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.

E. Prepare Application for Final Payment as specified in Section 01 77 00.

1.04 SUBMITTAL PROCEDURES

A. Submit to Engineer under transmittal letter.

B. Submit original plus two copies of each Application for Payment at time stipulated in pre-construction conference.

C. Submit with two copies of updated progress schedule; no payment will be certified without submission of updated schedules.

1.05 SUBSTANTIATING DATA

A. When Engineer requires substantiating information, submit data justifying line item amounts in question.

B. 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.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 31 13

PROJECT COORDINATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Coordination of the Contract.

B. Coordination of the work under this Contract.

C. Coordination of the work and division of responsibility of each subcontractor under this Contract.

1.02 DESCRIPTION

A. Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of construction elements with provisions for accommodating items to be installed later.

B. Coordinate and assign responsibility for completing various parts of the work to the appropriate subcontractor.

1.03 COORDINATION OF SUBMITTALS

A. Schedule and coordinate submittals specified in Section 01 33 00. Contractor fully responsible for providing all submittals within time periods allotted.

B. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

C. Coordinate request for substitutions to assure compatibility of space of operating elements and affect on work of other sections.

1.04 COORDINATION AND ASSIGNMENT OF RESPONSIBILITY TO SUBCONTRACTORS

A. Work under this Contract, including furnishing all equipment and materials and their proper installation, is specified under various sections in Divisions 1 through 28. Divisions are, in general, divided by trade. It is not the intent of these Specifications to imply that work specified under a particular Division must be performed by the trade normally associated with that Division.

B. The contractor shall assign responsibility for furnishing and for installing various material and equipment as specified herein to the appropriate subcontractors and trades, and shall determine the division of responsibility when there is interdependent work. This includes, but is not limited to, such items as:
   1. Furnishing and installing electric motors.
   2. Furnishing and installing motor starters.
   3. Furnishing and installing control wiring to equipment.
   4. Furnishing and installing conduit for control wiring to equipment.
   5. Furnishing and installing power wiring to equipment.
   6. Cutting and patching for various subcontractors.

C. Contractor shall assume full responsibility for settling any disputes or conflicts concerning interdependent work or work that is looked upon as belonging to more than one trade.

D. Prepare master schedule to record responsibilities under each section of Divisions 1 through 28 of this specification for actions which directly relate to mechanical and electrical work, including submittals and temporary utilities. Coordinate electrical power characteristics and control wiring requirements for each item of equipment and review such characteristics and requirements with both the mechanical and electrical subcontractors prior to ordering any equipment.

E. Distribute copies of schedule to engineer and to each concerned entity, subcontractor or trade.

1.05 COORDINATION OF EQUIPMENT SHUTDOWN WITH OWNER

A. Coordinate existing system or equipment shut-down with Owner's schedule, use, input. See Specification Section 01 35 00.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Pre-Construction Conference

B. Project Progress Meetings

C. Related:
1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary General Conditions, and Sections in Division 1 of these specifications.
2. Some of the items mentioned in this Section are described further in other pertinent Sections of these specifications.

1.02 PRE-CONSTRUCTION CONFERENCE

A. Schedule Pre-Construction Conference within seven (7) days after "notice to proceed." Representatives of the Owner, Engineer, and Contractor shall be in attendance.

B. Minimum Agenda:
1. List of subcontractors.
2. Distribution of Contract Documents.
3. Tentative construction schedule.
4. Coordination of Contractor and subcontractors
5. Designation of responsible personnel
6. Critical work sequencing.
7. Processing of observation reports, change orders, and applications for payment.
8. Submittals.
9. Use of construction site.
10. Coordination with work of others.
11. Delivery and storage.
12. Safety and emergency procedures.
13. Security procedures; keys.
14. Parking requirements.
15. Hazardous materials.

C. Location of meeting to be at the site or at a location determined by the Owner.

1.03 PROJECT PROGRESS MEETINGS

A. Project progress meetings will be held at site approximately once a week or as otherwise directed by the Owner's project manager during period of construction.

B. Representatives of Owner, Engineer, Contractor, and major subcontractors shall attend.

C. Contractor shall prepare meeting agenda, related to the Installation Contract, preside at meeting, prepare minutes of meeting and shall distribute copies of minutes within 3 days to Owner, Engineer, meeting participants, and other affected parties.

D. Minimum Agenda:

1. Review and approve previous meeting minutes.
2. Review work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede construction schedule.
5. Review off-site fabrication and delivery schedules.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules.
11. Pending changes and substitutions.
12. Review proposed changes for effect on Construction Schedule and on completion date.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project schedule.

B. Schedule of values.

C. Product evaluation data.

1.02 DEFINITIONS

A. Manufacturer's Product Data: Manufacturer's product data consist of one or more levels of manufacturers 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 PROCEDURES

A. Deliver submittals to Engineer at address listed on title sheet of project manual. Transmit each item by cover letter or with approved transmittal form referencing the project, the Owner, and the Contractor.

B. Engineer will require 15 days for review of submittal documents.

C. Revise and resubmit. Resubmittals shall be complete substitutions of original submittals unless specifically noted otherwise.

D. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

E. Submittal information required in Section 01 33 00 - 1.04 below must be provided regardless of whether the proposed item or work is in exact accordance with the specification requirements.

F. **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 without expense to the Owner.**

1.04 SUBMITTALS REQUIRED

A. Project Schedule:
1. A progress schedule for the proposed work, as outlined in the General Conditions and specified hereunder, shall be prepared and submitted for review.
2. Coordination: Contractor shall meet with Owner's representatives prior to preparing schedule to ascertain specific Owner scheduling requirements.
3. Submit three (3) copies of completed schedule for review. Upon Engineer's signed approval work may commence.
4. Format: Horizontal bar chart or CPM format at Contractor's option.
   a. Provide a separate time bar for work in each building in the contract. Provide a continuous vertical line to identify the beginning work day of each week.
   b. Within each time bar, indicate estimated completion percent increments.
   c. Coordinate construction schedule with the schedule of values, list of subcontractors, submittal schedule, payment requests, and other schedules.
   d. Indicate substantial completion date.
5. Schedule shall be continually updated. Submit revised schedule with each application for payment.

B. Schedule of Values:
1. A schedule of values for the proposed work, as outlined in the General Conditions and specified hereunder, shall be prepared and submitted for review.
2. Submit three (3) copies of schedule of values for review.
3. Prepare schedule of values using AIA form G703, columns A, B and C.
4. Applications for payment will not be accepted until the schedule of values has been approved by signature of Engineer.

C. Product Evaluation Data
1. Submit product evaluation data within 30 days of contract execution. Multiple submission or submission other than in one complete assembled document is not acceptable except where prior written approval is obtained. Where approval is obtained allowing the Contractor to submit after 30 days, a list of data remaining to be submitted and a date of submittal for each item shall be provided to the Engineer.
2. Manufacturer's product data shall be submitted as follows:
   a. Submit the number of sets of assembled submittal documents which the Contractor requires, plus three (3) additional sets which will be retained by the Engineer.

b. Submittals for manufacturer's product data shall be in sufficient detail to establish conformance with specified requirements. Specific features shall be marked with contrasting ink on printed literature. If translucent highlighting method is used, highlighted print shall be reproducible by photocopy.
c. 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.
d. Order of the bound contents shall be the same as in the submittal schedule.
e. Each item or logical group of items shall be identified by a separate tab marker in the bound document (example: "pumps", "air compressors", etc.).
f. Each bound document shall contain a Table of Contents which lists each tab and each item under each tab.
g. Catalog data (each separate item) shall be identified by the name of the item, the system, the applicable specification paragraph number, drawing number and schedule.

3. Shop drawings shall be submitted as follows:
   a. Submit the number of sets of shop drawings which the Contractor requires, plus three (3) additional sets which will be retained by the Engineer.
   b. 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.
   c. Minimum scale for shop drawings shall be 1/4" = 1'0" or larger if required for clarity.
   d. Reinforcement bending and placing submittals prepared in conformance with "Manual of Standard Practice for Detailing Reinforced Concrete Structures," ACI Publication 3.5.
4. Samples shall be submitted as follows:
   a. Submit two samples unless otherwise specified in individual specification sections.
   b. Include identification on each sample.
5. Certificates, test data, or other information shall be submitted as detailed in individual specification sections.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 35 00

SPECIAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Protection of work.

B. Maintaining systems operational.

C. Owner access and use.

D. Noise, dust, and odor control.

E. Security.

F. Furnishings to remain in work area.

1.02 PROTECTION OF WORK

A. Protect from damage any existing finishes, equipment, and adjacent work which is scheduled to remain.

1.03 MAINTAINING SYSTEMS OPERATIONAL

A. All systems currently operating including lighting, HVAC equipment, critical building systems and other systems in use, which serve Owner occupied areas, must be maintained operational during construction. If any system currently in use must be turned off during occupied hours to perform work, permission must be obtained and Owner notified prior to performing the work.

1.04 OWNER ACCESS AND USE

A. The Owner will occupy the facility during the entire course of the project. Normal occupancy hours from 7:30 AM to 5:30 PM Monday through Friday except as noted below:
   1. From June 18 through September 7, staff occupancy hours will remain as 7:30 AM to 5:30 PM; however, clinic hours will be from 9:00 AM to 4:30 PM. With Owner approval, work can be performed during staff occupancy hours but not during clinic hours.

1.05 NOISE, DUST, AND ODOR CONTROL

A. Construction noise and odor must be controlled to allow normal facility use by the Owner. Where work is performed in an occupied space during unoccupied hours or on the weekend, all construction debris, dust, and other materials must be cleaned prior to start of occupied period.

B. Dust resulting from construction must be contained within the work area. Where dust sensitive equipment, such as computers, is present in the work area, cover or otherwise enclose equipment to prevent damage.

C. The Owner's representative will be responsible for determining if noise, dust, and odor levels are objectionable in any area and has the authority to stop work to ensure compliance.

F. Conduct truck loading, unloading, and crane work so that noise is kept to a minimum.

1.06 SECURITY

A. The Contractor shall take all reasonable precautions to maintain building and site security during construction. The Contractor shall be responsible for all loss or damage from theft or vandalism resulting from inadequate security.

1.07 FURNISHINGS TO REMAIN IN WORK AREA

A. Owner will move staff, equipment, and materials to temporary location to facilitate the work as specified in Section 01 10 00 - SUMMARY OF WORK. Items of equipment, furnishings, and material not required for use by the Owner will remain at their present locations. Contractor shall take all precautions to protect Owner equipment, furnishings, and other materials left in work space from damage. Contractor is responsible for all damage to Owner equipment, furnishings, and materials resulting from work.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 CODES AND STANDARDS

A. Comply with national, state, and all local codes, safety orders, applicable building code ordinances, and requirements of the serving utility.

B. Design features outlined in the Contract Documents shall take precedence when over and above the requirements of relevant codes. Relevant codes serve only as minimum standards.

C. Where execution of the work as outlined in the Contract Documents would be in conflict with codes and standards, Contractor shall immediately notify the Engineer and shall not perform any work until clarification and direction are obtained. Contractor shall be responsible for and shall pay for all associated costs for correcting any work the Contractor performs which does not comply with codes and standards, whether or not it has been completed in accordance with the design as outlined in the Contract Documents.

D. All materials and equipment used shall, where rated, bear the seal of approval of the NFPA, UL, and conform to applicable ANSI, ASME, NEMA, and OSHA standards.

1.02 PERMITS AND INSPECTIONS

A. Plan check and permits will be obtained by Owner.

B. Contractor shall obtain the approved plans and specifications from the City of Eugene.

C. Contractor to review approved plans with Engineer prior to construction.

D. Contractor shall arrange for all required inspections and deliver certificates of final inspection upon completion of work.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Temporary Fire Protection.

B. Staging Areas and Materials Storage.

C. Electricity, Lighting.

D. Heat, Ventilation.

E. Telephone Service.

F. Water.

G. Sanitary Facilities.

H. Construction Aids.

I. Temporary Roofing.

J. Enclosures.

K. Barriers.

L. Cleaning during Construction.

M. Parking.

N. Field Offices and Sheds.

O. Removal.

1.02 TEMPORARY FIRE PROTECTION

A. Maintain existing fire protection, fire sprinkler and fire alarm systems in operable condition during construction.

B. Provide extensions and temporary systems to maintain specified or existing conditions for fire protection.

1.03 STAGING AREAS AND MATERIALS STORAGE.

A. Areas for staging and material storage as designated by Owner.

B. Materials and equipment stored in accordance with Section 01 60 00.

C. Clean and repair any damage caused during staging, handling, and storage of materials. Return areas and existing facilities to specified or original condition.

1.04 ELECTRICITY, LIGHTING

A. Connect to existing service, provide branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords. Owner will pay costs of energy used.

B. Provide lighting for construction operations.

C. Existing and permanent lighting may be used during construction. Maintain lighting and make routine repairs.

1.05 HEAT, VENTILATION

A. Coordinate use of existing facilities with Owner; extend and supplement with temporary units as required to maintain specified conditions for construction operations, and to protect materials and finishes from damage due to temperature or humidity. Owner will pay costs of energy used by existing facilities. Contractor to pay operating costs of temporary portable heaters using fuel sources not available at the site.

B. Prior to operation of permanent facilities for temporary purposes, verify that installation is approved for operation, and that filters are in place.

C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.06 TELEPHONE SERVICE

A. Provide telephone service to field office.

B. Provide telephone and directory listing name and business phone number of at least the following:
   1. Each contractor and subcontractor.
   2. Owner.
   3. Owner's consultants.
   4. Testing laboratories.
   5. Physicians.

1.07 WATER

A. Connect to existing facilities; extend branch piping with outlets located so that water is available by use of hoses. Owner will pay for water used.

1.08 SANITARY FACILITIES

A. Designated existing facilities may be used during construction operations; maintain in sanitary condition.

1.09 CONSTRUCTION AIDS

A. Provide and operate drainage and pumping equipment; maintain excavations and site free of standing water.

C. Designated existing stairs may be used by construction personnel. Coordinate use with Owner.

1.10 ENCLOSURES

A. Provide temporary weather-tight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials to prevent infiltration of rainwater, wind, and other elements, to allow for temporary heating, and to prevent entry of unauthorized persons.

1.11 BARRIERS

A. Provide as required to prevent public entry to construction areas, to provide for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations.

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

C. Provide barriers around trees and plants designated to remain. Protect against vehicular traffic, stored materials, dumping, chemically injurious materials, and puddling or continuous running water.

1.12 CLEANING DURING CONSTRUCTION

A. Control accumulation of waste materials and rubbish; periodically dispose of off-site. Contractor shall provide trash receptacles and pay for servicing.

B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.13 PARKING

A. On site vehicle parking limited to those areas designated by Owner.

1.14 FIELD OFFICES AND SHEDS

A. Contractor and subcontractors provide portable field offices at site or within the building for their own use and as necessary for performance of the work.

B. Provide sheds as necessary for storage of tools, materials, and equipment.

C. Location of exterior field buildings or interior office spaces to be designated by Owner.

1.15 REMOVAL

A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of two feet; grade site as indicated. Restore existing facilities used during construction to specified or to original condition.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Products.

B. Workmanship.

C. Manufacturer's Instructions.

D. Transportation and Handling.

E. Storage and Protection.

F. Owner furnished equipment.

1.02 PRODUCTS

A. Products include material, equipment, and systems.

B. Comply with specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a specification section shall be the same, and shall be interchangeable.

D. Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

1.03 WORKMANSHIP

A. Contractor shall perform all work in accordance with contract documents manufacturer's instructions, codes, and recognized industry standards. Work determined to be of inferior quality by Owner's representative shall be replaced at no expense to Owner.

1.04 TRANSPORTATION AND HANDLING

A. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

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

1.05 MANUFACTURER'S INSTRUCTIONS

A. Perform work in accordance with Manufacturer's instructions.

B. Do not omit preparatory or installation procedures required by Manufacturer, unless specifically modified or exempted by Contract Documents.

C. When Contract Documents require work to comply with Manufacturer's instructions, obtain and distribute such instructions to parties performing work including two copies to Engineer. Maintain one set at job site during installation and until acceptance.

D. Handle, install, connect, clean, condition, and adjust products in strict accordance with such instructions and in conformance with specified requirements.

E. Should job conditions or specified requirements conflict with Manufacturer's instructions, notify Engineer immediately. Do not proceed with work without clear instructions.

1.06 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weathertight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

E. After installation, provide coverings to protect products from damage from traffic and construction operations, remove when no longer needed.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Requirements and limitations for cutting and patching of work.

1.02 COORDINATION OF WORK

A. See Section 01 10 00 - SUMMARY OF WORK.

B. It is the responsibility of the Contractor to provide cutting and patching to allow the installation of materials and equipment as specified under Divisions 1 through 28 or to assign the responsibility for cutting and patching to the appropriate trade or subcontractor.

C. Areas to be patched as a result of demolition work are shown on some drawings. Additional patching may be required. It is the Contractor's responsibility to coordinate with all trades to ensure that all repair and refinishing work necessary for the completion of the project is accomplished.

1.03 DESCRIPTION

A. Execute cutting, fitting, and patching to complete work and to:
1. Fit the several parts together, to integrate with other work.
2. Uncover work to install ill-timed work.
3. Remove and replace defective and non-conforming work.
4. Remove samples of installed work for testing where requested.
5. Provide openings in non-structural elements for penetrations of mechanical and electrical work.
6. Provide openings in exterior walls for equipment installation.

1.04 SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:
1. Structural integrity of any element of the project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance or safety of any operational element.
4. Visual qualities of site exposed elements.

B. Include in request:
1. Necessity for cutting or alteration.
2. Description of proposed work and products to be used.
3. Alternates to cutting and patching.
4. Date and time work will be executed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Match those provided in original installation.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

B. After uncovering, inspect conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions by contractor.

3.02 PREPARATION

A. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of project from damage.

B. Provide protection from elements for areas which may be exposed by work; maintain excavations free of water.

3.03 PERFORMANCE

A. Cut openings, pockets, and chases neatly. Use carborundum saws or approved means or devices. Saw cut pavement with vertical straightline joints. Locate cuts at existing joint, reveal, or other pattern mark.

B. Execute work by methods to avoid damage to other new or existing work, and which will provide proper surfaces to receive patching and finishing.

C. Fit work airtight in interior walls, watertight in exterior walls, to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

D. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection or previous joint; for an assembly, refinish entire unit.

E. Repaint surfaces to match existing surfaces to nearest break.

F. Patch openings left in floors, walls, or ceilings from pipe or conduit removed to match existing walls or floors.

3.04 ADJUSTMENTS

A. Where partitions or foundations are removed, patch floors, walls, and ceilings with finish materials to match existing.
   1. Where removal of partitions results in adjacent spaces becoming one, rework floors and ceilings to provide smooth lanes without breaks, steps, or bulkheads.
   2. Where extreme change of grade of 2-inches or more in 8 feet occurs, request instructions from Engineer as to method of making transition.

3.05 TRANSITION FROM EXISTING TO NEW WORK

A. When new work abuts or finishes flush with existing work, make a smooth and workmanlike transition. Patched work shall match existing adjacent work in texture and appearance so that the patch or transition is invisible at a distance of five feet.
   1. When finished surfaces are cut in such a way that a smooth transition with new work is not possible, terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface per Owner's approval.

3.06 CLEANING

A. Perform final cleaning as specified in Section 01 74 23.
   1. Maintain all areas including contract occupied areas in a clean, hazard free condition.
   2. Clean spillage, overspray, and heavy collection of dust in Owner occupied areas immediately.

B. At completion of work of each trade, clean area and make surfaces ready for work of successive trades.

C. At completion of alterations work in each area, provide final cleaning and return space to a condition suitable for use.

END OF SECTION

SECTION 01 74 23

FINAL CLEANING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Final cleaning of project.

1.02 DESCRIPTION

B. Perform exterior and site cleaning. Provide final cleaning of interior areas. All to be accomplished prior to Substantial Completion of the work.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS

A. Use materials which will not create hazards to health or property, and which will not damage surfaces.

B. Use only materials and methods recommended by manufacturer of materials being cleaned.

PART 3 - EXECUTION

3.01 CLEANING

A. In addition to removal of debris and cleaning specified in other sections, clean interior and exterior exposed-to-view surfaces.

B. Remove temporary protection and labels not required to remain.

C. Clean finishes free of dust, stains, films, and other foreign substances.

D. Clean and damp mop, resilient and hard-surface floor as specified.

E. Vacuum clean carpeted and similar soft surfaces.

F. Clean surfaces of equipment; remove excess lubrication.

G. Clean plumbing fixtures to a sanitary condition.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDED

A. Closeout Procedures

1.02 DEFINITIONS:

A. Substantial Completion: In addition to the definitions of Substantial Completion included in the General Conditions, Substantial Completion is further defined to include equipment start-up, operator training, and receipt of draft operations and maintenance manuals.

1.03 CLOSEOUT PROCEDURES

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.

B. When Contractor considers work has reached final completion, submit written certification of the following items:
   1. Contract Documents have been reviewed.
   2. Work has been inspected by Contractor for compliance with Contract Documents.
   3. Work is complete in accordance with Contract Documents and is ready for inspection.
   4. Each system has been tested and verified operational.

C. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted contract sum, previous payments, and sum remaining due.

D. Owner will issue a final change order reflecting approved adjustments to Contract sum not previously made by change order.

E. Contractor will deliver the items listed below to the Owner and obtain receipts for same.
   1. Extra filter media: See Section 23 41 00.

1.04 RE-INSPECTION OF WORK

A. If re-inspection for Substantial Completion or Final Completion is required, the cost to Owner of all Engineer's re-inspection services will be deducted from the Contract Sum.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compilation of product data and related information required for maintenance of products.

B. Preparation of operation and maintenance data and instructions for systems and equipment.

C. Submittal of operation and maintenance data.

1.02 SUBMITTALS

A. Submit four copies of operating and maintenance manuals for all operating apparatus and equipment furnished under the Contract to the Engineer 30 days or more prior to date of final inspection.

B. Bind manuals in 3-inch, 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.

C. Manuals shall contain full information for each item of mechanical, electrical, or other operating equipment, including:
1. Schematic diagrams of all control systems.
2. Circuit directories for each electrical and communications panelboard.
3. Manufacturer's instructions for installation, startup, operation, inspection, and maintenance.
4. Lubrication schedules.
5. Performance capacity.
6. Catalog data sheets.
7. Parts list.
8. Maintenance schedules.
9. List of recommended spare parts.

D. 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.

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.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Maintenance and submittal of record documents and samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. In addition to requirements in general conditions, maintain at the site one record copy of:
1. Contract drawings.
2. Specifications.
3. Addenda.
4. Change orders and other modifications to the contract.
5. Reviewed shop drawings, product data, and samples.
6. Field test records.
7. Inspection certificates.

B. Store record documents and samples apart from documents used for construction. Provide files, racks, and secure storage for record documents and samples.

C. Label and file record documents and samples in accordance with section number listings in Table of Contents of this project manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

D. Maintain record documents in a clean, dry and legible condition. Do not use record documents for construction purposes.

E. Keep record documents and samples available for inspection by Engineer.

1.03 RECORDING

A. Record information on a set of blueline opaque drawings, provided by Owner.

B. Use felt tip marking pens for recording information: Red for additions, green for deletions.

C. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

D. Contract drawings and shop drawings: Legibly mark each item to record actual construction, including:

E. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

F. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.

G. Field changes of dimension and detail.

H. Changes made by modifications.

I. Changes to control diagrams and schematics.

J. Details not on original contract drawings such as conduit and wiring runs.

K. References to related product data, shop drawings, and modifications.

L. Specifications: Legibly mark each item to record actual construction, including:
1. Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.
2. Changes made by Addenda and modifications.

M. Other Documents: Maintain manufacturer's certifications, inspection certifications, and field test records required by individual specifications sections.

1.04 SUBMITTALS

A. Prior to final completion deliver record drawings and samples to Owner.

B. Transmit with cover letter in duplicate, listing:
1. Date.
2. Project title and number.
3. Contractor's name, address, and telephone number.
4. Number and title of each record document.
5. Signature of contractor or authorized representative.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 02 41 00

DEMOLITION AND SALVAGE

PART 1 - GENERAL

1.01 DEMOLITION

A. Perform demolition work required for completion of new work, as shown on drawings, and as specified herein. Demolition plans and specifications generally show the extent of demolition required. They do not relieve contractor of responsibility for all demolition required to complete the work under this Contract.

B. Completely remove all piping, wiring, conduit, and other devices associated with the equipment not to be re-used in the new work. This includes all pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. Seal all openings after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained.

C. Perform only that demolition work necessary and required for completion of new work.

D. All demolition work other than minor work to be reviewed with and approved by Owner prior to starting.

E. In addition to demolition shown, cut, move or remove items as necessary to provide access, to allow alterations and new work to proceed, or items that abandoned and serve no useful purpose. Include such items as:
   1. Repair or remove hazardous or unsanitary conditions.
   2. Remove unsuitable or extraneous materials not marked for salvage, and debris such as rotted wood, rusted metals, and deteriorated concrete.
   3. Remove abandoned items and items serving no useful purpose as a result of the work of this contract such as abandoned piping, conduit and wiring. Remove items back to active piping mains or junction boxes.

1.02 REMOVED MATERIAL

A. Salvage all pieces of equipment which are removed as a result of new work, and which are not intended for reuse to Owner unless specifically waived by Owner. If waived by Owner, equipment shall become the property of the Contractor and shall promptly be removed from the work site. Do not store or permit debris to accumulate on site.

B. Care should be taken when removing salvaged equipment to avoid damage and to maintain equipment in an operational condition. Contractor is responsible and shall pay for all damages to salvaged equipment found to be non-operational after delivery to Owner.

1.03 COORDINATION WITH EXISTING TO REMAIN

A. When demolition work affects the support, access to, or operation of existing equipment or materials, Contractor shall provide new support, access means, and any other modifications necessary to maintain existing systems fully maintainable, operational, and in compliance with regulatory codes.

1.04 PROTECTION

A. Protect workers, passers-by, and neighboring property from injury and damage. Protect existing building services including roofing and flashing from damage. Protect access and egress in public areas. Provide temporary guardrails and barricades to assure safe access through adjacent areas of construction. Protect existing utilities and active services to all operating systems indicated or not.

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for the installation of all rough carpentry.

1.02 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 1999.

B. APA PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels (Form E445); 2001.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2010.

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

1.03 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Acoustic insulation.

D. Gypsum sheathing.

E. Gypsum wallboard.

F. Joint treatment and accessories.

1.02 REFERENCE STANDARDS

A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

B. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 1999 (R2005).

C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (R2005).

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2009a.

E. ASTM C 475/C 475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002 (Reapproved 2007).

F. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 2009a.

G. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.

H. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2009a.

I. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 2008.

J. ASTM C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2007.

K. ASTM C 1002 - 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.

L. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2009.

M. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2008.

N. ASTM C 1178/C 1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2008.

O. ASTM C 1280 - Standard Specification for Application of Gypsum Sheathing; 2009.

P. ASTM C 1396/C 1396M - Standard Specification for Gypsum Board; 2009a.

Q. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2000 (Reapproved 2005).

R. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 2005.

S. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010.

T. ASTM E 413 - Classification for Rating Sound Insulation; 2004.

U. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2010.

V. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2008.

W. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2009.

1.03 SUBMITTALS

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

B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

C. Test Reports: For all stud framing products that do not comply with ASTM C 645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C 840 and GA-216.

2.02 METAL FRAMING MATERIALS

A. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754.
   2. Studs: "C" shaped with flat or formed webs with knurled faces.
   3. Runners: U shaped, sized to match studs.
   4. Ceiling Channels: C shaped.

B. Ceiling Hangers: Type and size as specified in ASTM C 754 for spacing required.

C. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Georgia-Pacific Gypsum LLC: www.gp.com/gypsum.
   3. National Gypsum Company: www.nationalgypsum.com.
   4. USG Corporation: www.usg.com.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.

2.04 ACCESSORIES

A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 inch.

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

C. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.
   1. Types: As detailed or required for finished appearance.
   2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
   3. Manufacturers - Finishing Accessories:
      a. Same manufacturer as framing materials.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
   2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.

E. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

F. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C 754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.

C. Studs: Space studs as permitted by standard.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 BOARD INSTALLATION

A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Installation on Metal Framing: Use screws for attachment of all gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Corner Beads: Install at external corners, using longest practical lengths.

B. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C 840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Floors, unless specifically so indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2008.

C. ASTM D 4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

1.04 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, 12 x 12 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.

E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.05 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.

1.06 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 10 feet long by 10 feet wide, illustrating special coating color, texture, and finish.

C. Provide door and frame assembly illustrating paint coating color, texture, and finish.

D. Locate where directed.

E. Mock-up may remain as part of the work.

1.07 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.

1.08 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paints Manufacturers:
   1. Ameron
   2. Benjamin Moore
   3. Carboline
   4. ICI Paints
   5. Parker
   6. Kelly-Moore
   7. R.J. McGlennon
   8. Miller
   9. PPG Pittsburgh Paints
   10. Rodda
   11. Sherwin Williams
   12. Tnemec
   13. USG

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

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each coating material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 MATERIALS

A. Provide paint products from one or more manufacturers as required to comply with the color / gloss level / product type combinations. The gloss level of manufacturer's product numbers in this specification may not match the required gloss level specified. Adjust manufacturer's product numbers within the same quality line to match the required gloss level.

B. Interior
   1. Enamel, Gloss Level 5, on Metal (System A):
      a. Prime Coat:
         1) Ferrous Metals:
            (a) First coat alkyd metal primer.
            (b) Manufacturers: ICI Paints "4160 Devguard".
         2) Galvanized Metals:
            (a) First coat alkyd metal primer
            (b) Manufacturers: ICI Paints "4160 Devguard".
         3) Non-Ferrous Metals:
            (a) First coat alkyd metal primer
            (b) Manufactuers: ICI Paints "4160 Devguard".
      b. Second and Third Coats
         1) Interior / exterior alkyd resin enamel, gloss level 5
         2) Manufacturers: ICI Paints "2516 Ultra-Hide Durus".
   2. Acrylic, Gloss Level 5, on Gypsum Board (System J):
      a. Prime Coats
         1) Vinyl acrylic latex primer.
         2) Manufacturers: USG: "Sheetrock Brand Primer Surfacer Tuff-Hide."
      b. Second and Third Coats:
         1) 100% acrylic latx, gloss level 5
         2) Manufacturers: ICI Paints "Lifemaster 2000," LM 9200.

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. Test shop-applied primer for compatibility with subsequent cover materials.

E. 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.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's instructions.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Sand wood and metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

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

3.05 SCHEDULE - COLORS

A. P-1, Brand: Miller, Number 8161W, Name: Sulfer Springs

B. P-2, Brand: Miller, Number CW033W, Name: Floral White

C. P-11, Brand: Miller, Number 7683M, Name: Green

END OF SECTION

SECTION 20 05 00

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 Engineer 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 HVAC systems. The work includes but is not limited to:
   1. Provide new HVAC systems to serve the northeast wing of the building. Systems will include:
      a. Installation of Owner-furnished air handling unit.
      b. Reconfiguration of existing and addition of new duct systems.
      c. Installation of chilled beam heating and cooling units.
      d. New heating water and chilled water pumps and piping.
   2. Modify existing building 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 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 Engineer.

B. Check drawings of other trades to avert possible installation conflicts. Should major changes from original drawings be necessary to resolve such conflicts, notify Engineer and secure written approval and agreement on necessary adjustments before installation is started.

1.04 SUBMITTALS AND SHOP DRAWINGS

A. Provide in accordance with SECTION 01 33 00 – SUBMITTAL PROCEDURES.

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 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 – MECHANICAL

		Code
20 05 13	Motors For Mechanical Equipment	-
20 05 14	Motor Control Devices for Mechanical Equipment	-
20 05 19	Meters and Gauges for Mechanical Service	1,2
20 05 23	General Duty Valves for Mechanical Service	1,2
20 05 29	Pipe Hangers, Supports, Sleeves and Seals	1,2
20 05 45	Vibration Isolation for Mechanical Systems	1,2
20 05 48	Seismic Control for Mechanical Systems	9
20 05 53	Identification for Mechanical Systems	1
20 05 93	Testing, Adjusting and Balancing for Mechanical Systems	9

DIVISION 23 – HVAC

23 07 00	HVAC Insulation	-
23 21 13	Hydronic Piping	-
23 31 19	Hydronic System Specialties	1,2
23 21 23	Hydronic System Pumps	2,3
23 25 13	Water Treatment for Hydronic Systems	9
23 31 13	Metal Ductwork	-
23 31 17	Flexible Ductwork	1,2
23 31 19	Ductwork Supports, Hangers, and Seals	1,2
23 33 00	Ductwork Accessories	1
23 37 00	Air Outlets and Inlets	1,2
23 41 00	Particulate Air Filtration	-
23 73 13	Modular Indoor Central-Station Air Handling	-
23 82 27	Chilled Beams	1,2,3,4

DIVISION 25 – INTEGRATED AUTOMATION

25 10 00	Building Automation Systems	9
25 30 00	Field Installed Control System Components	9
25 90 00	Automatic Controls Sequence of Operation	9

1.05 QUALITY ASSURANCE

A. All materials and equipment provided hereunder shall be installed and start-up 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.

1.06 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.

1.07 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).

1.08 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.

1.09 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.
   7 - Special Requirements – See individual sections.

		Code
DIVISION 20 – MECHANICAL		
20 05 13	Motors For Mechanical Equipment	-
20 05 14	Motor Control Devices for Mechanical Equipment	-
20 05 19	Meters and Gauges for Mechanical Service	1
20 05 23	General Duty Valves for Mechanical Service	1,5
20 05 29	Pipe Hangers, Supports, Sleeves and Seals	-
20 05 45	Vibration Isolation for Mechanical Systems	4
20 05 48	Seismic Control for Mechanical Systems	-
20 05 53	Identification for Mechanical Systems	-
20 05 93	Testing, Adjusting and Balancing for Mechanical Systems	7

DIVISION 23 – HVAC

23 07 00	HVAC Insulation	-
23 21 13	Hydronic Piping	-
23 31 19	Hydronic System Specialties	1
23 21 23	Hydronic System Pumps	1,2,3,4,5,6
23 25 13	Water Treatment for Hydronic Systems	7
23 31 13	Metal Ductwork	-
23 31 17	Flexible Ductwork	-
23 31 19	Ductwork Supports, Hangers, and Seals	-
23 33 00	Ductwork Accessories	-
23 37 00	Air Outlets and Inlets	-
23 41 00	Particulate Air Filtration	-
23 73 13	Modular Indoor Central-Station Air Handling	-
23 82 27	Chilled Beams	1,3,4

DIVISION 25 – INTEGRATED AUTOMATION

25 10 00	Building Automation Systems	7
25 30 00	Field Installed Control System Components	7
25 90 00	Automatic Controls Sequence of Operation	7

1.10 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.

1.11 DEMONSTRATION

A. General: After installation is complete, demonstrate to Engineer's 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 Engineer.
2. Operate completed system for one week.
3. Verify that control verification is complete and verification report has been approved by Engineer.

C. Arrange for demonstration with Owner, Engineer, required factory technicians, and installer at least one week in advance of demonstration.

1.12 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 16-hours on-site to instruct

Owner in operation and maintenance of systems and equipment. 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 72-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, structural support, seismic restraint, and revisions to associated mechanical and electrical systems needed to provide equal system performance and maintainability.

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 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 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, 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 Engineer. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the Engineer for determination of proper design for openings through structural sections and obtain layout approval prior to cutting or drilling into structure. After 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 Engineer 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 where possible, 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 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.

3.04 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.

C. 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.

D. Verify that piping has been flushed and cleaned prior to startup.

3.05 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

SECTION 20 05 13

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. Conduit box and leads: Diagonal split with gasket. 90 degree steps. Stranded wire leads, insulated, permanently identified.
5. Service Factor: 1.15 at 40 degrees C ambient temperature for 60 cycle NEMA design B.
6. Nameplate: Embossed stainless steel fastened to frame with pins.
7. Finish: Factory applied primer and enamel.
8. Conduit box: Provided with knockouts.

9. 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

SECTION 20 05 14

MOTOR CONTROL DEVICES FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Combination Motor Starters

B. Variable Frequency Drives

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.

PART 2 - PRODUCTS

2.01 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.

2.02 VARIABLE FREQUENCY DRIVE CONTROLLER

A. Acceptable Manufacturers: ABB, to match Owner standard.

B. General: Digital PWM controller listed and labeled to provide variable speed control of a standard NEMA Design B, 3-phase, induction motor by adjusting output voltage and frequency. UL Listed as a complete assembly.

C. Performance:
1. Output Rating: 3-phase, 1 to 120 hz, current rated at 8 kHz carrier frequency.
2. Stepless motor control from 0.1% to 110% of motor base speed.
3. Ambient Temperature: 0 to 40^{o}C
4. Capable of riding through short power dips without a controller trip.
5. Capable of starting into a rotating load regardless of direction.
6. All programmable settings held in non-volatile memory and not affected by power outages or dips.
7. Slip compensation circuit for 1% speed regulation.

D. Adjustable Control Parameters:
1. Acceleration: 0.1 to 999.9 seconds.
2. Deceleration: 0.1 to 999.9 seconds.
3. Current Limit: 50 to 110% of maximum rating.
4. Carrier frequency: 4 to 8 khz.

E. Safety Features:
1. Input surge suppression.
2. External fault protection allowing wiring of remote safety contacts.
3. Instantaneous overcurrent trip.
4. Loss of input or output phase protection.
5. Ground fault protection.
6. Under and over voltage protection.
7. Output phase-to-phase short circuit protection.
8. Electronic overload circuit recognized by UL & NEC as adequate motor protection.

F. Control and Monitoring Features:
1. Panel mounted manual start/stop speed control, manual/automatic speed control selection and run/jog selection.
2. Panel mounted digital display of voltage output, current output, input kW, totalized kWh consumption, elapsed run time, frequency output, motor rpm, time stamped fault indication, and DC bus volts.
3. Automatic restart settable by number of restart attempts and time interval between restarts.
4. Settable automatic and manual torque boosts.
5. DC braking programmable in amplitude and direction.
6. Multiple programmable preset speeds that will force VFD to preset speed upon user contact closure.
7. Relay contacts for remote indication of drive fault or motor running.
8. Multiple programmable frequency avoidance bands.
9. Multiple programmable volts/hZ patterns.
10. Speed controller capable of maintaining a constant motor speed or process setpoint using field mounted process input signal and/or remote setpoint input signal. PI control capability. Remote setpoint configurable using zero and space parameters.
11. Input and output contacts programmable and capable of performing the following function:
    a. Remote Start/Stop.
    b. Emergency drive shutdown.

c. Drive run/off operating status.

G. Input/Output Points
1. Network Communications: Communications protocol compatible with Siemens Apogee Building Automation System. (P-1)
2. Remote Start/Stop: Digital Input.
3. Emergency Stop: Digital input.
4. Drive Run/Off Status: Digital output.
5. Drive Alarm: Digital output.
6. Process Variable Control Input Signal: Analog input, 4 to 20 mA DC.
7. Remote Speed Control Setpoint: Analog input, 4 to 20 mA DC.
8. Speed Feedback: Analog output, 4 to 20 mA or 0 to 10 VDC.

H. Accessories:
1. Integral main disconnect mounted within the standard NEMA 1 or NEMA 12 enclosure to shut off all power to both the controller and bypass.
2. VFD Bypass: Factory assembled. Packaged within VFD enclosure and mechanically isolated. Provide Bypass/Off/Automatic selection switch to automatically switch between operating modes. Selection of bypass mode will completely isolate all VFD components including drive and controller from the motor power supply and motor shall operate at full speed. Isolation may include operation of one manual service switch. Thermal overload relays to provide motor protection in both Automatic and Bypass modes. Arrange to allow service to VFD components with unit in Bypass mode with motor operating.
3. AC input line reactor: 3 phase, 3% impedance.

I. Enclosure:
1. VFD and all accessories are mounted within a packaged NEMA 1 or NEMA 12 enclosure, except provide NEMA 3R equipped with thermostatically controller cooling and heater for outdoors locations.

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.

3.03 VARIABLE FREQUENCY DRIVE CONTROLLER

A. Maintain required clearances around unit enclosure.

B. Set overload devices according to measured current of motor.

C. Measure and document input voltage and current to drive.

D. Adustment

1. Set V/Hz curve according to application.
2. Adjust acceleration and deceleration parameters to obtain pump/fan speed-torque acceleration requirements within motor capacity.
3. Adjust low and high frequency limit parameter for project conditions.
4. Set current limit.
5. Configure VFD parameters to the motor automatically restarts after a power failure.

E. Manufacturer’s Field Service: Certified manufacturer's representative to provide the following services:
1. Inspect after installation is complete. Complete manufacturers’ installation and start-up report and submit copy to Engineer certifying that installation and operation is in accordance with manufacturer's recommendation.
2. Perform initial start-up.
3. Adjust configuration parameters for project conditions.
4. Document initial configuration. Provide hard copy and electronic copy for inclusion in O&M manuals. Provide copies for each set of manuals.
5. Provide minimum 4 hours of training including operation and maintenance. Coordinate training time with Owner’s Authorized Representative minimum 14 days prior to training. Training shall be performed after substantial completion and will not occur on the same day as equipment start-up.

END OF SECTION

SECTION 20 05 19

METERS AND GAUGES FOR MECHANICAL SERVICE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Bimetal Thermometers.

B. Pressure Gauges.

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.

2.02 PRESSURE GAUGES (Hydronic)

A. Ashcroft, Marsh, Palmer, Taylor, Trerice, Weiss.

B. Materials:
1. Bezel Ring: Friction fit.
2. Lens: Plastic.
3. Pointer: Adjustable.
4. Scale: Black printing on white. 270 degree arc, 0 to 60 range, 1 psi increments. 0 to 100 psi range, 1 psi increments, or as required for system pressure encountered. Range

selected so that operating pressure approximately half of full range or maximum scale value exceeds maximum pressure, whichever scale range is greater.

5. Elastic Chamber: Phosphor bronze or stainless steel alloy bourdon tube.
6. Multiplying Mechanism: Stainless steel rotary.
7. Case: 3-1/2 inch diameter, steel drawn, molded nylon, or die cast aluminum. Direct pipe mounting.
8. Connectors: Brass, bottom location. ¼-inch male NPT.
9. Accuracy: ANSI, B40.1, Grade 2A.

C. Accessories:

1. Throttler: Pressure snubber, ¼-inch NPT. Brass body, bronze core for water service.
2. Cock: Tee handle gauge cock, brass, ¼-inch NPT.

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 hydronic system is filled with water and leak tested.

3.03 PRESSURE GAUGES

A. Install in piping where shown on drawings. Bourdon tube material suitable for fluid measured.

B. Water Service: Gauge cock, throttle, and gauge installed in that order.

C. Range selected so that operating pressure approximately half of full range.

D. Ensure gauge sockets are installed in proper locations before Hydronic systems are filled with water and leak tested.

3.04 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

SECTION 20 05 23

GENERAL DUTY VALVES FOR MECHANICAL SERVICE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Non-rising stem gate valves.

B. Ball valves.

PART 2 - PRODUCTS

2.01 NON-RISING STEM GATE VALVES

A. Acceptable Manufacturers: Hammond, Kennedy, Milwaukee.

B. 2-inch and Smaller: Bronze body ASTM B62, 125 psi saturated steam, 200 psi WOG, bronze wedge, threaded connections to match fittings specified for associated piping. Rising stem, union bonnet. MSS SP-80

C. 2-1/2 inch and Larger: Cast iron body ASTM Al26 Class B, rated for 125 psi saturated steam, 200 psi WOG, bronze or bronze faced wedge and seats, 125 psi ASME flanged ends, non-rising stem, bolted bonnet, renewable seat rings. MSS SP-70

D. Accessories: Provide chain operators on all valves 4-inch and larger located in mechanical rooms more than 8-feet above finished floor.

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.

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. Install gate valves with stem in vertical position wherever possible. Horizontal stem position is acceptable if vertical position is not practical or where shown on drawings. Downward stem position not allowed.

D. Where drain valves are required, provide 3/4" ball valve with hose end connection and brass cap with EPDM seal.

3.02 ADJUSTMENT

A. Check and adjust valves and accessories for smooth operation.

END OF SECTION

SECTION 20 05 29

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.

1.02 RELATED SECTIONS

A. SECTION 20 05 45 – VIBRATION CONTROL FOR MECHANICAL SYSTEMS

B. SECTION 20 05 48 – SEISMIC 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.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all equipment in accordance with manufacturer’s recommendation.

B. 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 Piping:

Nominal Pipe Size	Hanger Type
1/2" - 1-1/2"	Adjustable Ring
2" and above	Adjustable Clevis

2. Heating Water:

1/2" - 2"	Adjustable Clevis
2-1/2" and above	Adjustable Steel Yoke Pipe Roll

3. Drain Piping:

All sizes	Adjustable Ring

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.

D. Spacing: Support horizontal piping as follows:

Pipe	Sizes	Spacing	Hanger Rod
Carbon Steel	1/2"	5'-0"	3/8"
	3/4, thru 1-1/4"	6'-0"	3/8"
	1-1/2", thru 2"	10'-0"	1/2"
	2-1/2", thru 3"	12'-0"	1/2"
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.

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. Sleeves:
1. General: Install at all concrete or masonry walls or floors where detailed.
2. Core drill hole in existing concrete or masonry for sleeve installation. Cast in place for new work.
2. Terminate sleeves flush with walls, partitions, or ceilings. Terminate sleeves 2-inches above floor level at floor penetrations.
3. X Fasten sleeves securely to structure. Take precautions to prevent debris from entering annulus between pipe and sleeve during construction.
4. For interior non-waterproof wall penetrations, seal annulus with Dow-Corning 3-6548 silicone RTV foam or equal.

B. Escutcheons: Install escutcheons at all wall, ceiling, or floor pipe penetrations to finished areas.

END OF SECTION

SECTION 20 05 45

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.

C. Spring Hanger (SH-3):
1. Steel spring in neoprene cup or ¼ inch neoprene acoustical friction pads between spring and support.
2. Neoprene element molded with rod isolation bushing that passes through hanger box
3. Steel spring located in neoprene cup with grommet to prevent short circuiting of hanger rod.
4. 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.
5. Springs minimum additional travel to solid equal to 50 percent of rated deflection.
6. Similar to Mason Industries, Inc. Type 30 or W30.

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.

3.03 APPLICATION

A. Piping:
   1. Horizontal: Provide vibration isolators on first three pipe supports or hangers from motor driven mechanical equipment connections for piping 2-inches and larger. Isolators shall have the same deflection as the connected equipment. Heat exchangers, air separators, and expansion tanks are considered part of the piping run. SH-1 for hung piping. Minimum 1.0 inch deflection.

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. SH-3. Minimum 0.75 inch deflection.

END OF SECTION

SECTION 20 05 48

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. Provide seismic piping isolation where piping travels between portions of building that are seismically separated.

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) air handlers, pumps, 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.
3. Floor-Mounted: Equipment located on and attached to floor.

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:
1. Use seismic design criteria designated by code for site.
2. Site Classification: D
3. Peak Spectral Response Acceleration: .569

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, 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, 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

SECTION 20 05 53

IDENTIFICATION FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Piping Identification

B. Valve Identification

C. Equipment Identification

D. Regulatory Signage

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. 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 Chart:
1. Valve identification number for each valve.
2. Location of each valve.
3. Purpose of each valve.
4. 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 COORDINATION

A. Submit labeling scheme to Owner for review and approval prior to installation.

3.02 PREPARATION

A. Ensure surfaces are clean, dry, and free of debris before attaching nameplates.

3.03 PIPE IDENTIFICATION

A. Provide labels for piping. Labels shall be visible from walkways and service locations.

B. Locations of Pipe Labels as follows:
1. Adjacent to equipment connections.
2. Adjacent to each valve and fitting, except plumbing fixtures.
3. At each branch and riser take-off.
4. At each passage through wall, floor and ceiling construction.
5. At each passage to underground.
6. On all horizontal pipe runs every 25 feet.
7. Minimum one marker between pieces of equipment.

C. Label piping to match Owner standards as follows.
1. Hot water heating supply.
2. Hot water heating return.
3. Chilled water supply.
4. Chilled water return.
5. Chilled beam supply.
6. Chilled beam return.

3.04 VALVE IDENTIFICATION

A. Identify all valves specified in Division 23.

B. Valve Charts: One copy in each O&M manual.

C. Continue existing numbering sequence for new valves installed in existing buildings.

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 clear adhesive labels with bold black lettering 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.

3.06 TEMPORARY IDENTIFICATION

A. Temporarily identify piping during installation. Paint, chalk or other similar method allowed.

END OF SECTION

SECTION 20 05 93

TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes testing, adjusting, and balancing of air and water systems specified in Division 23 – Heating, Ventilating and Air Conditioning (HVAC). Work shall generally consist of volume adjustments, speed adjustments, performing tests, recording equipment data and measurements, and preparing reports to achieve system performance as required by Contract Documents.

1.02 DEFINITIONS

A. TAB: Testing, adjusting, and balancing.

B. AABC: Associated Air Balance Council.

C. NEBB: National Environmental Balancing Bureau.

D. Project Supervisor: Individual employed by balancing contractor having administrative and technical responsibility for work performed under this Section.

E. BAS: Building Automation System. Automatic control system consisting of standalone or integrated digital controllers used to control HVAC equipment.

1.03 SUBMITTALS

A. Contractor Qualifications: Submit documentation within 14 days of the Contract Date demonstrating that TAB Contractor and Project Supervisor are AABC or NEBB certified.

B. Weekly Reports: Provide weekly status reports after balancing has started. Reports shall include a summary of work completed, abnormal or deficient conditions encountered, and updated schedule of work.

C. Draft Balancing Report: When balancing is complete in whole or for any major phase of work, provide three copies of draft balancing report to Engineer for review. Engineer shall provide written review comments to Balancing Contractor. Balancing report shall include information and data providing an exact record of system performance, documenting compliance with specification requirements, and enabling independent verification of all measurements. Reports shall include notes and comments necessary to clearly communicate balancing results. Report contents shall include the following information:
   1. NEBB certification.
   2. Identification of all test instruments used and the last calibration dates.
   3. Plans or schematic diagram showing the location of equipment, measurement locations, and terminal devices. Plans shall show equipment and terminal device designation corresponding to report forms.
   4. Testing and balancing documentation recorded on AABC or NEBB report forms. Each report form shall include the name of individual performing TAB work. Forms shall be fully completed with all relevant data entered.
   5. Summary of BAS system calibration measurements and tests required to establish setpoint or control parameters.
   6. Summary of minimum outside air ventilation measurements and adjustments.

7. Summary of all conditions which are not in conformance with Contract Documents.
8. Copy of written directives from the Engineer and other relevant project correspondence.

D. Final Balancing Report: Provide six certified copies of final balancing report bearing seal of Project Supervisor. Update draft balancing report responding to draft report review comments.

1.04 QUALITY ASSURANCE

A. Balancing Contractor and Project Supervisor shall be certified by AABC or NEBB. Approved contractors: Air Balancing Specialties; Air Introduction and Regulation, Inc.; Northwest Engineering Services, Inc., Southern Oregon Air Balancing.

B. All work under this Section shall be performed under the direction of the Project Supervisor.

1.05 SEQUENCING

A. Prebalancing meeting shall be conducted 30 days prior to start of balancing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Test Instruments: Furnished by Contractor.

B. Plugs: Provide plastic plugs in test holes drilled in ductwork.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Review Contract Documents for testing and balancing devices that are not included but necessary to complete work such as balancing dampers, valves, flow measuring stations, test plugs, access doors, etc. Submit list of recommended additional devices needed to perform work.

B. Review Contract Documents for any conditions that are unclear, contradictory, or otherwise may prevent specified systems from achieving design performance. Submit list of conditions observed.

3.02 APPLICATION

A. Work shall be performed in accordance with the latest addition of the AABC National Standards or NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

B. Accuracy of measurements and balancing tolerances shall be in accordance with AABC or NEBB standards.

C. Special Balancing Procedures

1. Motors: Record starter overload settings. List overload part number and rating for bimetallic overloads or setpoint for adjustable overload devices.
2. Pumps: Perform dead head test for all pumps ½ hp and larger.
3. Mark final position of balancing devices after balancing is complete.

D. BAS Calibration and Testing
1. Perform tests as required to determine BAS control setpoints and control parameters including but not limited to:
   a. Outside air damper settings to achieve minimum ventilation rates under all operating conditions.
   b. Minimum pressure setpoints for variable volume air or water system speed control required to meet peak load conditions.

E. Balancing is complete when following conditions are achieved:
1. Systems and components are tested and balanced within specified tolerances.
2. All efforts within the extent of TAB have been exhausted, and systems or components are not operating within acceptable tolerances. Balancing is not complete until written notification of all abnormal or deficient conditions is provided to the Engineer, written direction is received, and all work required by Contract Documents is fully completed.

3.03 QUALITY CONTROL

A. Testing instruments shall be reliable, accurate, and in good working order. Calibration maintenance of all instruments shall be in accordance with AABC and NEBB requirements.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Piping Insulation.
1. Glass fiber insulation.
2. PVC jacket and fitting covers.
3. Insulation jackets for valves, fittings, and equipment.

B. 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 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 Jacket and Fitting Covers
1. Acceptable Manufacturers: Certainteed, John Manville, Knauf, 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. Insulation Jackets for Valves and Accessories.
1. Type: One-piece, custom blanket type insulating jacket, silicone coated fiberglass cloth, 1" internal insulation, PTFE coated glass fiber draw cord, PTFE impregnated glass fiber threaded construction.
2. Maximum Operating Temperature: 450^{o}F.

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"
Chilled Water, Indoor	40-65	GF	**Note 1, Note 2**				
Heating Water Indoor	105-220	GF	**Note 1**				
Note 1: Insulation thickness as required by Code.							
Note 2: Chilled beam supply and return not included.							

2.02 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 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,
6. Vapor barriers shall be continuous and uninterrupted throughout systems with operating temperature 60^{o}F and below.
7. Insulate piping individually.
8. Do not insulate the following piping components:
    a. Instrumentation piping.
    b. Vent and drain piping, except where protective insulation is required to prevent physical damage.
    c. Unions
    d. Orifice Flanges
    e. Expansion devices, flexible connectors

B. Glass Fiber Insulation
1. Butt all joints firmly together. Seal all longitudinal joint laps and circumferential butt strips. Seal all vapor barrier penetrations on cold piping with application of vapor barrier mastic.
2. Fittings: PVC fitting covers with pre-cut fiberglass inserts. Completely fill fitting cover with fiberglass inserts to level of adjacent insulation. Tape fitting joints. Seal seam edges with vapor barrier mastic on cold piping.

3.03 DUCT INSULATION

A. Unless constructed of pre-insulated ductwork or shown on drawings as internally lined, insulate the following ductwork.
1. New supply air ductwork
2. Existing supply air ductwork where shown on drawings.
3. Return air outside of conditioned spaces.
4. 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

SECTION 23 21 13

HYDRONIC PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Recirculated water piping for HVAC systems.

1.02 QUALITY ASSURANCE

A. Entire installation shall conform to B31.9 Building Service Piping.

PART 2 – PRODUCTS

2.01 HEATING WATER PIPING

A. Piping: Seamless copper water tube, ASTM B 88 hard drawn, Type L.

B. Fittings:
1. ANSI B16.22: Wrought copper and bronze solder joint pressure fittings.
2. Joining: Solder up to 1-1/4 inches. Braze 1-1/2" 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.

2.02 CHILLED WATER PIPING AND CHILLED BEAM 1-INCH AND LARGER

A. Piping: Seamless copper water tube, ASTM B 88 hard drawn, Type L.

B. Fittings:
1. ANSI B16.22: Wrought copper and bronze solder joint pressure fittings.
2. Joining: Solder up to 1-1/4 inches. Braze 1-1/2" 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 CHILLED BEAN PIPING LESS THAN 1-INCH

A. Pipe: ASTM F1281, Multilayered cross-linked PEX-AL-PEX polyethylene pipe. Similar to Viega FostaPEX.

B. Fittings: Press fittings. ASTM F1282.

2.04 CONDENSATE DRAIN PIPING

A. Piping: Copper, ASTM B306 hard drawn Type DWV.

B. Fittings: ANSI B16.29: Soldered wrought copper and bronze solder joint drainage fittings.

C. Solder Materials: ASTM B 32, 95-5 Tin-antimony (Sb5). Fed. Spec. FS-0-F-506C, non-corrosive flux.

2.05 CONTROL AND INSTRUMENTATION PIPING

A. Instrument process piping to pressure gauges, pressure transmitters, and flow elements: 3/8-inch 316L, stainless steel; ASTM A 213/A269; 316 stainless steel Swagelok compression fittings.

B. Instrument and control piping connected to service piping having an operating temperature of 55^{o}F or less and penetrating piping insulation shall be constructed using galvanized steel, bronze, or stainless steel fittings and bushings. Use materials compatible with service piping.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Piping, equipment, appurtenances and devices installed in professional manner in conformance with the Specifications and drawings. Changes in direction made by appropriate use of fittings. Approved provisions made for expansion and flexibility in water piping. Arrange piping to drain to equipment, drain point, or as approved.
1. Where optional piping materials is specified are a specific service, all piping provided for that service must be of the same type.

B. Piping Layout:
1. Give special attention to appearance of complete installation.
2. Make provision for expansion and contraction during normal operation.
3. Do not obstruct openings or passageways.
4. Run parallel to walls of building.
5. Keep free of contact with building construction or installed items.

C. Cutting: Cut pipe from measurements taken at the site, not from drawings.

D. Drainage: Arrange so that system can be completely drained.

E. Copper Piping
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.

F. Plastic Piping
1. Workmanship:
a. Examine pipe and fittings before installation to ensure that no defective materials are incorporated.
b. Keep inside of pipes and fittings free of dirt and debris.
2. Connection to different types of pipe by means of flanges, specified adapters, or transition fittings.

3.02 CLEANING

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.

3.03 INSPECTION

A. No piping covered or concealed until it has been first tested, inspected and approved.

3.04 TESTING

A. Heating Water, Chilled Water, and Chilled Beam Water
1. Instruments, vessels, equipment, and accessories which cannot withstand the test pressure required of attached piping shall be isolated from the piping. Remove or block and vent directly operated or self-contained regulators. Each part of a pipe system shall be tested for the time specified for the given class of test.
2. Piping and vessels shall be vented when draining them to prevent their collapse by vacuum.
3. The test crew shall seat valves under test by normal hand tightening or by normal use of operator furnished with valve. Over-tightening of a valve in an effort to make it hold will be cause for rejection of the valve.
4. The pipe system installer shall provide all necessary connections, vents and drains to test and drain the system completely.
5. No testing shall be done when the ambient space temperature is below 40^{o}F.
6. Allowance shall be made by the inspector for variations of pressure and volume due to temperature changes in determining satisfactory maintained test pressure.
7. The inspector shall check the test pressure at the beginning and end of each test before acceptance of the system.
8. Pipe systems shall be tested and accepted before insulation, paint, or other covering or coating is applied. The only exceptions are for those parts, including vessels, which have been painted, covered or coated and have had previous certification tests.

B. All tests shall be logged as to date and time and pressure at start and end of test. Owner's Authorized Representative shall witness and approve tests.

END OF SECTION

SECTION 23 21 19

HYDRONIC SYSTEM SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wye Strainers

B. Automatic Air Vents

C. Test Plugs

D. Automatic Flow Control Valves

E. Flow Metering Stations

F. Consolidated Fittings

1.02 SUBMITTALS

A. Flow Measuring Station: Provide valve schedule listing each station furnished along with model number, line size, design flow, permanent pressure drop, and measurement differential pressure at design flow.

PART 2 – PRODUCTS

2.01 WYE STRAINERS

A. Acceptable Manufacturers: Armstrong, Mueller Steam Specialty, Metraflex, Spirax Sarco, Watts.

B. 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.

C. Closed, chemically-treated hydronic systems: Bronze body.
1. 2-Inch and Smaller: Brass wire screen, 20 mesh.
2. 2-1/2-Inch to 4-Inch: Brass screen, .057 inch (1/16-inch) diameter perforations.

2.02 AUTOMATIC AIR VENTS

A. Acceptable Manufacturers: Spirotherm, Honeywell.

B. Description: Similar to Spirotherm Spiro Top.

C. Construction: Brass body and vent head. Non-ferrous float. Viton seal and o-ring. 150 psi max working pressure.

2.03 TEST PLUGS

A. Acceptable Manufacturers: Siscoe P/T Plugs, Pete's Plug, Waymire, or approved.

B. Description:
1. Body: 1/4-inch NPT, solid brass, 1/8-inch probe diameter.
2. Seal: Nordel for maximum 275°F service.
3. Cap: Cap with gasket when not in use.
4. Rating: 1000 psig.

2.04 AUTOMATIC FLOW CONTROL VALVES

A. Acceptable Manufacturers: Griswold Controls, Flow Design.

B. General: Automatic flow control valve, factory set to maintain flow within 5% of specific rate. 2-32 psi pressure drop operating range. Equipped with 2 pressure temperature ports.

C. Construction:
1. Internal wear surfaces nickel or stainless steel.
2. Internal flow cartridge equipped with machined threads to compensate for free spring height without use of fixed shims. Permanently marked with gpm and spring range.

D. ½-inch to 2-inch: Brass Y-type or straight through body. Threaded connections similar to Flow Design Model YR.

E. 2-1/2-inch and larger: Ductile iron body mounted wafer-style between 150 psi companion flanges. Similar to Flow Design Model WS.

2.05 FLOW METERING STATION (FMS)

A. Armstrong, Tour Anderson, or approved.

B. Globe style configuration for flow measurement, flow balancing, and positive shut-off. Two inches and smaller bronze construction, threaded connections. 2-1/2-inch and larger cast-iron construction, flanged connections. Brass trim, Teflon or resin seat, bronze disc, 125 lb. flanges, 250 psi maximum working pressure. Quick connect test ports upstream and downstream of valve seat. Hand wheel shall incorporate vernier valve position scale with hidden memory stops. Valve furnished with preformed insulation jacket, ASTM 1784, Class 14253-C. 250 PSI working pressure.

2.06 CONSOLIDATED FITTINGS

A. Acceptable Manufacturers: Griswold Controls, Flow Design.

B. Two-way Control Valve Arrangements: One supply fitting and one return fitting. Supply fitting assembly consisting of a ball valve, wye strainer, pressure/temperature tap. Return fitting assembly consisting of a ball valve, venturi with two pressure/temperature taps arranged to measure water flow rate.

C. Three-way Control Valve Arrangements: One supply fitting, return union fitting, and return fitting. Supply fitting assembly consisting of a ball valve, wye strainer,

pressure/temperature tap, and union. Return union fitting consisting of union, air vent, and pressure/temperature tap. Return fitting assembly consisting of a ball valve, and automatic flow control valve with two pressure/temperature taps arranged to measure pressure differential across flow control valve.

D. Components:
1. Ball Valve: Brass body, chrome-plated or stainless steel ball, Teflon seals, full port, 400 psig working pressure. Adjustable memory stops.
2. Wye Strainer: Cast brass construction, 20 mesh stainless steel screen.
3. Pressure/Temperature Taps: 1/4-inch NPT, solid brass, 1/8-inch probe diameter. Nordel seal for maximum 275^{o}F service. Cap with gasket.
4. Venturi: One-piece, non ferrous bronze/brass venturi. High/low signal, +/- 3% accuracy full scale.
5. Automatic Flow Control Valve: factory set to maintain flow within 5% of specific rate. 1-20 psi pressure drop operating range. Equipped with 2 pressure temperature ports.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. 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.
4. Provide ball valve with hose end connection on blowoff outlet of hydronic system strainers.
5. Provide globe valve on blowoff outlet of steam system strainers.
6. Provide pressure gauge. Pipe to strainer inlet and outlet. Provide ball valve at each connection.

C. Automatic Air Vents: Provide automatic air vents at system high points including but not limited to:
1. Top of each multiple floor piping riser.

D. Test Plugs
1. Location:
   a. Provide test plugs where shown on drawings.
   b. Provide test plug immediately adjacent to each control system component that senses temperature or pressure. For differential pressure transmitters, provide test plug adjacent to both high pressure and low pressure sensing ports.
2. Arrangement:
   a. Install so temperature probe and pressure gauge probe can easily be inserted and removed with no obstruction.
   b. Install so temperature and pressure gauges can easily be read.

E. Suction Diffuser
1. Remove startup screen after two weeks of operation and prior to final balancing.

F. Flow Metering Stations: Install in piping where shown on drawings and as recommended by manufacturer. Install with minimum 5 pipe diameters of straight pipe without valves or

fittings downstream and 10 upstream of station. Same size as pipe diameter or as shown on drawings.

G. Consolidated Fittings
1. Install so temperature probe and pressure gauge probe can easily be inserted and removed with no obstruction.

END OF SECTION

SECTION 23 21 23

HYDRONIC SYSTEM PUMPS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. In-Line Centrifugal Pumps

1.02 PERFORMANCE REQUIREMENTS

A. Pump and motor combination shall be non-overloading at all points on pressure-capacity curve.

B. If equipment is approved which has different flow or pressure drop requirements than schedule, contractor shall select new pumps with capacity and pressure capabilities adjusted to maintain scheduled pump efficiency and requirements. Select pumps so that the head-capacity curve slopes up to maximum pressure at shut-off. Contractor will provide all additional or larger electrical components required by an approved pump having greater horsepower than scheduled.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver unit in manufacturer's original packaging.

B. Handle and store to keep clean from deteriorating elements and to prevent physical damage.

PART 2 - PRODUCTS

2.01 IN-LINE CENTRIFUGAL PUMPS

A. In-line Circulator Pump
1. Acceptable Manufacturers: Bell and Gossett Series 60, Armstrong Series 1000, Taco 1600 Series, PACO Series H.
2. Casing: Cast-iron bronze fitted construction, rated for 175 psig working pressure, suction and discharge gauge port and flanged connections. Constructed to permit complete servicing without disconnecting piping or electrical connections.
3. Impeller: Bronze, enclosed type, keyed to shaft, hydraulically and dynamically balanced.
4. Seal: Mechanical, carbon seal ring, ceramic or Ni-resist seat. 225^{o}F working temperature.
5. Shaft: Stainless steel or carbon steel with bronze or stainless steel sleeves through seal chamber. Integral thrust collar.
6. Bearings: To oil lubricated bronze sleeve bearings.
7. Coupling: Flexible.
8. Motor Starters: Provided hereunder as scheduled, refer to SECTION 20 05 14 - MOTOR CONTROL DEVICES FOR MECHANICAL EQUIPMENT.
9. Capacity: As scheduled on Drawings.

B. Vertical In-line Pump
   1. Acceptable Manufacturers: Bell and Gossett Series 80, Armstrong Series 4380, Paco VL, Taco VI.
   2. Casing: Cast-iron design, rated for 175 psig or 1.5 times actual discharge working pressure whichever is greater, suction and discharge gauge port, air vent, wear rings, seal flush connection, drain plug, flanged suction and discharge.
   3. Impeller: Bronze, fully enclosed, keyed to shaft and secured with locknut, hydraulically and dynamically balanced.
   4. Seal: Mechanical, carbon seal ring, ceramic or Ni-resist seat. 225^{o}F working temperature.
   5. Shaft: Stainless steel or carbon steel with bronze or stainless steel sleeves through seal chamber.
   6. Motor: Provided hereunder. See Section 20 05 13 – MOTORS FOR MECHANICAL EQUIPMENT.
   7. Motor Starters, Variable Frequency Drives: Provided hereunder as scheduled, refer to SECTION 20 05 14 - MOTOR CONTROL DEVICES FOR MECHANICAL EQUIPMENT.
   8. Capacity: As scheduled on drawings.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Provide pressure gauge. Connect gauge to pump suction and discharge. Provide ball valve at each connection.

B. Support piping and pump trim adjacent to pump so that pump weight is distributed equally between inlet and outlet piping.

C. In-line Centrifugal Pumps:
   1. For horizontal installations requiring a reducer for pump connection, install eccentric reducer with level top to prevent air accumulation.
   2. Provide minimum of 5 pipe diameters of straight pipe upstream of pump inlet.

D. Provide minimum of 5 pipe diameters of straight pipe upstream of pump inlet.

3.02 ADJUST

A. Start-up pump in accordance with manufacturer's instructions. Take amperage reading and turn off immediately if above nameplate value and report to Engineer.

B. Adjust to eliminate excessive noise and vibration. Check adjacent vibration isolators to ensure that vibration is not transmitted to structure.

END OF SECTION

SECTION 23 25 13

WATER TREATMENT FOR HYDRONIC SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cleaning and treatment for closed loop hydronic systems.

1.02 SUBMITTALS

A. Manufacturer's literature for cleaning and treatment compounds. Manufacturer's recommended cleaning and treatment procedures.

1.03 QUALITY ASSURANCE

A. Technical Services: Provide the services of an experienced water treatment chemical engineer or technical representative to direct flushing, cleaning, and pre-treatment.

B. Approved Providers: Mount Hood Chemical.

PART 2 - PRODUCTS

2.01 CLEANING AND TREATMENT FOR CLOSED LOOP HYDRONIC SYSTEMS

A. Alkaline phosphate, nonphosphate detergent, or other approved proprietary compound suitable to remove organic soil, hydrocarbons, flux, pipe mill varnish, pipe compounds, iron oxide, and like deleterious substances, with or without inhibitor, suitable for system wetted metals.

B. Inhibitor: Provide sodium silicate, sodium nitrite/borate, or other approved proprietary compound suitable for make-up quality and make-up rate and which will not cause or enhance bacteria/corrosion problems or mechanical seal failure due to excessive total dissolved solids. Shot feed manually. Maintain inhibitor residual as determined by water treatment laboratory, taking into consideration residual and temperature effect on pump mechanical seals.

C. pH Control: Inhibitor formulation shall include adequate buffer to maintain pH range of 8.0 to 10.0.

D. Performance: Protect various wetted, coupled, materials of construction including ferrous, and red and yellow metals. Maintain system essentially free of scale, corrosion, and fouling.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Delivery and Storage: Deliver all chemicals in manufacturer's sealed shipping containers. Store in designated space and protect from deleterious exposure and hazardous spills.

B. Install equipment furnished by the chemical treatment supplier and charge systems according to the manufacturer's instructions and as directed by the Technical Representative.

C. Where work includes the expansion of an existing hydronic system the Contactor is responsible for cleaning and treatment of new portions only, unless the working fluid in the existing system must be drained to perform work. Then the entire systems must be cleaned and treated. Where fluid in an existing system is retained, the contractor shall test water chemical treatment concentrations prior to beginning work and provide a preliminary test report to the Owner's Authorized Representative describing any deficient conditions. Any modification of an existing system prior to submitting preliminary test report constitutes acceptance of existing conditions.

D. Provide branch connections, isolation valves, bypass piping and all other temporary facilities necessary to perform work specified herein, including circulation pumps to facilitate cleaning.

3.02 REPORT

A. Submit treatment report to Engineer describing cleaning and treatment processes, chemicals used, and test results. Include copy of treatment report in O&M manual.

END OF SECTION

SECTION 23 31 13

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; unless otherwise listed below:
1. Supply air ductwork in VAV systems upstream of terminal units – 4" wg.
2. Supply ductwork in mechanical rooms – 6" wg.
3. Return ductwork in mechanical rooms – 3" wg.
4. Laboratory exhaust ductwork – 6" wg negative.

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 and Flat oval 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:

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 AND OVAL 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.
2. Fume Hood Exhaust: Stainless steel, ASTM A167, class 304 for exhaust ductwork from the fume hood to the associated exhaust fan.

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 BUILT-UP PLENUMS

A. Material: Galvanized steel, ASTM A527, G-60.

B. Fabrication: Minimum gauge, construction, joint reinforcing, and supports shall be in accordance with SMACNA “HVAC Duct Construction Standards”
1. Sealing: Seal seams, joints, and connections with liquid duct sealer.
2. Insulation: 2-inch duct liner for outside air plenums.
3. Liner: 24 gauge, perforated.
4. Access doors: Minimum one, 24 inch by 60 inch, or as shown on drawings.

2.04 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.

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. Joint Sealing: All duct joints sealed before insulating.

END OF SECTION

SECTION 23 31 17

FLEXIBLE DUCTWORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Flexible Ductwork

PART 2 – PRODUCTS

2.01 FLEXIBLE DUCTWORK

A. Acceptable Manufacturers
1. Automation Industries, Inc., Certainteed, Genflex, JP Lamborn Co.

B. Low Pressure Insulated Flexible Ductwork, Below 2-inch static pressure:
1. Description: Fiberglass insulation wrapped around a continuous, 2-ply polyethylene air tight inner liner, reinforced with an encapsulated steel wire helix, polyethylene outer vapor barrier.
2. Insulation Value: R-4.2
3. Approvals: UL-181 Class 1 Air Duct, NFPA 90A & 90B
4. Working pressure 4" w.g. positive, ½ w.g. negative
5. Maximum velocity: 4000 FPM.

C. Ductwork Accessories
1. Ductwork strap: Heat stabilized Nylon suitable for continuous operation to 250^{o}F, tensile strength 175 lbs, UL 181 listed.
2. Duct tape: Aluminum foil backed, rated temperature -20^{o}F to 250^{o}F, UL 181, ASTM 3330.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Flexible Ductwork
1. Installation in professional manner with no sagging or drooping. Maximum length of 2-feet or as detailed on drawings.
2. Joint Sealing:
   a. Tape inner duct liner to ductwork.
   b. Secure inner duct liner with ductwork strap.
   c. Secure outliner with ductwork trap.
3. Hang ductwork as recommended by manufacturer.

END OF SECTION

SECTION 23 31 19

DUCTWORK HANGERS, SUPPORTS, AND SEALS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Support and bracing of HVAC ductwork.

1.02 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.

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 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 fastened 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

SECTION 23 33 00

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Manual Balancing Dampers

B. Spin-in Fittings

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. Cable Controls
1. General: Provide cable (Bowden) controls on all damper regulators above hard ceilings.
2. Components:
   a. Young dampers #5020CC (round) or #830ACC (rectangular).
   b. Cable (Bowden) Control Kit.
   c. Casing and wire, Bowden #BCW. Maximum length 50-feet.

2.02 SPIN-IN FITTINGS

A. Acceptable Manufacturers: Cody Company, Inc., Crown Products, Hercules Industries, or as approved.

B. Construction
1. Material: Hot dipped galvanized steel sheet, ASTM-A6853 CS type B.
2. Gauges: 4" through 10": 30 gauge; 12" through 16": 28 gauge.
3. Features: Manual volume damper:
   a. Sizes 4" through 10" have damper with ¼" regulator.
   b. Sizes 12" through 16" have reinforced damper axis with ¼" regulator, end bearing with washer and wing nut.
4. Scoop: Penetrates into trunk duct air stream.

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.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Diffusers and Grilles

B. Air Louvers and Accessories

PART 2 - PRODUCTS

2.01 DIFFUSERS, REGISTERS, AND GRILLES

A. 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. Suspended T-bar ceilings: lay-in, 24x24 modules.
   b. Hard ceilings: surface-mounted, beveled drop face.

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

SECTION 23 41 00

PARTICULATE AIR FILTRATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pleated medium efficiency filters

1.02 QUALITY ASSURANCE

A. Where filter MERV ratings are specified, filters shall be testing in accordance with ASHRAE Standard 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

1.03 EXTRA MATERIAL

A. Medium and High Efficiency Filters: All installed filters shall be clean at time of occupancy. Replace filters if units were operated prior to occupancy and filters are dirty. Condition of filters shall be determined by the Owner's Authorized Representative. Provide one additional set of replacement filters to Owner at occupancy.

PART 2 - PRODUCTS

2.01 PLEATED MEDIUM EFFICIENCY FILTER (F-1)

A. Acceptable Manufacturers: American Air Filter, Farr, Flanders.

B. Pleated filter consisting of cotton/synthetic media, support grid, and enclosing frame.
1. Depth: As required to accommodate filter frame.
2. MERV Rating: 8
3. UL 900: Class 1
4. Initial resistance: 0.33 inches w.g. at 500 fpm.
5. Maximum Rated Pressure Drop: 2 inches w.g.
6. Basis of Design: Camfil Farr 30/30.

C. Size and Capacity: As scheduled or as furnished by equipment manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturers recommendations.

B. Install equipment and filter racks to provide adequate access for filter removal and replacement.

C. Filters shall fit tightly in frames to provide complete air seal as intended, and to prevent air bypass. Provide spacers or other devices as required to maintain tight contact between filters when access door is closed.

D. Filters shall fit in racks without bending, distortion, or modification.

E. Filters shall be clean and in like new condition at time of building occupancy.

3.02 START-UP

A. Install filters prior to equipment start-up. No equipment shall be operated without filters installed.

B. During construction filters shall be minimum MERV 8.

END OF SECTION

SECTION 23 52 18

FACTORY-BUILT FAN COIL UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Vertical Fan Coil Units

1.02 REFERENCE STANDARDS

A. All factory-built fan coil units and accessories shall be designed, manufactured and tested in accordance with the latest applicable industry standards including the following:
   1. UL 723
   2. ARI Standard 410, 440 and 350

B. All equipment and material to be furnished and installed on this Project shall be UL or ETL listed, in accordance with the requirements of the authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 VERTICAL FAN COIL UNITS

A. Acceptable Manufacturer: Nailor, Enviro-tec
   1. Great American Coil Co
   2. Heatcraft
   3. Nailor Industries

B. Chassis fabricated of 18 gauge, G-60 galvanized steel panels able to meet 125 hour salt spray test per ASTM B-117. Exterior panels insulated with 1/2" thick, 2lb/cubic foot insulation. Fan deck minimum 16 gauge galvanized steel. The fan coil unit cabinets designed to have gypsum wall board applied directly to the fan coil unit surface and all openings for registers, grilles and openings shall have standard 1/2” drywall flanges. Exposed metal surfaces powder coat painted over electro-galvanized sheet steel.

C. The welded cooling coil condensate drain pan shall have 1” sides and be fabricated of 20 gauge, 304 stainless steel and internally sloped to drain completely. The drain pan shall be externally insulated with minimum 1/4” thick elastomer foam fire retardant insulation. Insulation adhered to the stainless steel drain pan with a full coat of waterproof adhesive.

D. All coils shall be ARI 410 certified and tagged with an ARI 410 label with the minimum rows required to meet the specified capacity. 1/2" O.D. seamless copper tubes with collared and corrugated aluminum fins. All tubes mechanically expanded to provide an efficient, permanent bond between the tube and fin. Coil frames shall be constructed of minimum G-90 galvanized steel. All coils shall be pressure tested under water to 300 psig. Heating coils furnished in the reheat position as standard. All water coils provided with a manual air vent fitting to allow for coil venting. Water velocity in the tubes shall not exceed eight (8) feet per second and the coil face velocity shall not exceed 500 fpm.

E. Centrifugal fan blower wheels shall be forward curved type, double width, double inlet direct drive type. Unit fan shall be constructed of zinc coated galvanized steel for corrosion resistance. The fan assembly shall be removed and serviced through the front of the unit. The entire assembly shall be able to come out of the unit easily by removing four lock nuts and unplugging the motor.

F. Fan motors shall be ECM or specifically designed for use with a single phase, 120 Volt, 60 hertz electrical input. Motor complete with and operated by a single phase integrated controller/inverter that operates the wound stator and senses rotor position to electrically commutate the stator. All motors designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero (0) rotor losses. Built-in soft start and slowed speed change ramps. Permanently lubricated with ball bearings and direct coupled to the blower. Motor shall maintain a minimum of sixty-five (65%) percent efficiency over its entire operating range. Provide isolation between fan motor assembly and unit casing in at least four (4) locations to eliminate any vibration from the fan to the terminal unit casing. Provide isolation between the motor and blower as well as between the blower and casing.

G. The entire vertical fan coil unit assembly shall be factory wired to a single point connection. All power and control wiring shall conform to National Electric Code Standards and local requirements of the authorities having jurisdiction. The fan coil unit assembly shall include all required devices, including but not limited to, service switch, relay, control power transformers and control packages, low voltage remote shutdown relays, etc.

H. The fan coil unit manufacturer shall furnish the unit with 1" thick pleated MERV 7 throw-away type media air filters.

I. The vertical fan coil manufacturer shall verify at the manufacturer's factory the operation of each fan coil before shipment.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All factory-built fan coil units shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations and as indicated on the Drawings.

B. All factory-built fan coil units shall be installed to allow for proper cooling coil condensate drainage through the traps.

END OF SECTION

SECTION 23 73 13

MODULAR INDOOR CENTRAL STATION AIR HANDLING UNITS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Installation of owner-furnished modular indoor central station air handling unit. Units and all related accessories described under Section 2 – Products below will be provided by Owner.

B. Owner will be responsible for arranging delivery and offloading Owner furnished equipment at the site.

C. Contractor will inspect equipment to verify the condition of all components and report any shipping damage or other deficiencies prior to start of work. Start of work will signify that Contractor acknowledges that equipment is in good condition and ready for installation.

D. Part 2 – Products is provided for the Contractor's information. Submittals will be furnished when available.

1.02 DEFINITIONS

A. External Static Pressure: Static pressure difference between supply air and return air ductwork connections.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. McQuay, Temtrol.

2.02 MODULAR INDOOR AIR HANDLING UNIT

A. Description: Factory assembled, consisting of fans, motor and drive assemblies, coils, dampers, plenums, filters, drain pans motor controllers, and accessories. Similar to McQuay Vision Customized Air Handler.

B. Configuration: As shown on drawings. Constructed in sections small enough to be transported through building and re-assembled in existing mechanical room.

C. Casing:
1. General: Heavy gauge panels and posts secured with metal fasteners. All panels access doors, and ship sections sealed with permanently applied bulb-type gasket.
2. Panels: 2-inch thick, thermally broken, double-wall assembly. Closed cell injected foam insulation, minimum R-13. Solid inner liner and 0.125 inch aluminum treadplate floor.
3. Base Rail: Full 6-inch perimeter base rail for structural rigidity and condensate trapping.

4. Access Doors. Double wall construction matching walls and floors. Two "Ventlock" or equal latches operable from either side of door. Doors gasketed with minimum of two six-inch long stainless steel piano type hinges. Provide access doors as required to repair and maintain equipment components. Doors sized to remove internal components without disassembling unit. Door swing shall oppose cabinet pressurization. Access doors to service pressurized sections must have safety label.
5. Finish: Two component etch bond primer, and alkyd enamel finish.

D. Fans: Type and performance as scheduled. Forward-curve wheels galvanized steel or bonderized steel painted with baked enamel finish. Airfoil wheels steel painted with zinc chromate primer and an enamel finish. Statically and dynamically balanced wheel and shaft. Fans shall be IRD balanced at design RPM to a vibration velocity less than or equal to 0.080 inches per second measured at each bearing pad prior to shipment with motor, sheaves and belts in place. Fan housing welded steel construction. Solid, ground, and polished carbon steel shafts, SAE 1045, keyed to wheel, coated with rust inhibitor. Tested in accordance with AMCA Standard 210.

1. Bearings: Air handler quality, self-aligning, grease lubricated, pillow block, selected for a minimum L50 life of 500,000 hours at maximum cataloged operating conditions in accordance with ABMA-9. Grease fittings extended to accessible location near access door.
2. Vibration Isolation: Fan and motor mounted on an all welded structural steel internal isolation base with four spring-type isolators located at each corner. Isolators shall be free standing with sound deadening pads and leveling bolts. Spring deflection minimum of 1-inch. Flexible fabric connection at fan discharge. Spring isolators shall have seismic restraints. Provide thrust restraints where required.
3. Drive and Belts: Provide hereunder V-Belt, Cast-Iron Sheave, See SECTION 23 05 31 - V-BELTS AND SHEAVES. Provide adjustable sheave on motors 15 hp and less. Provide metal belt guards as required by OSHA. Provide belt guards with openings for fan tachometer readings and sized to allow either sheave to be increased two sizes.
4. Motor: Provided hereunder, see SECTION 20 05 13 – MOTORS FOR MECHANICAL EQUIPMENT. Locate adjacent to access door.
5. Motor Starters, Variable Frequency Drives: Provided hereunder as scheduled, refer to SECTION 20 05 14 - MOTOR CONTROL DEVICES FOR MECHANICAL EQUIPMENT.
6. Balancing: Statically and dynamically balance fan section assemblies including fan wheels, shafts, bearing, drives, belts, isolation bases, and isolators.

E. Heating and Cooling Coils:

1. Provided hereunder, refer to SECTION 23 82 16 – AIR COILS.
2. Drain Pans: Continuously welded stainless steel, insulated. Terminate drain connection on side of unit. Provide drain pan for cooling coil sections. Intermediate drain pans required for multiple coils or coils with a height greater than 48 inches. Sloped for complete drainage with no standing water.

F. Filters: Provided hereunder, refer to SECTION 23 41 00 – PARTICULATE AIR FILTRATION.

G. Automatic Mixing Dampers: Opposed blade or parallel blade as required to provide adequate mixing. Provided hereunder, refer to SECTION 25 30 00 - FIELD INSTALLED CONTROL SYSTEM DEVICES.

H. Face and Bypass Damper Section: Internal face and bypass damper to modulate airflow through and around heat transfer coils. Blank-off and division sheets, internal linkage, access doors installed by unit manufacturer. Low-leakage design, opposed blade with vinyl bulb edge and stainless steel edge seals.

I. Electrical Connections:
1. Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.
2. Fan Motors: Single point electrical power connections for motors. Motor controller factory installed and power wiring provided between controller and motor.

J. Accessories
1. Filter gauges: Magnehelic, +/- 2% of full scale, sensing probes, piping, and shutoff valves for each gauge. Provide one gauge for each filter bank. Refer to SECTION 20 05 19 – METERS AND GAUGES.

K. Acoustic Performance
1. Sound power levels for fan assemblies shall be established in accordance with AMCA 300 and 310.
2. Sound power levels (db) for assembled unit shall be established by testing or by calculation.
3. Sound power levels for units and components shall not exceed values listed below:

SOUND POWER LEVELS (db)								
Frequency	63	125	250	500	1000	2000	4000	8000
AHU-3								
Supply air outlet	86	86	83	82	84	81	80	77
Return air inlet	83	83	79	78	77	74	70	76
Unit radiated	78	78	71	65	64	58	45	41

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install as shown on drawings and as recommended by manufacturer.

B. Rig and set unit in place. Use spreader bars to protect unit from lifting cables.

C. Install unit level.

D. Provide trap at each drain connection. Install piping from each drain connection to floor drain.

E. Provide concrete housekeeping pad or galvanized steel structural support furnished by unit manufacturer where clearance is not available to install condensate traps in drain piping.

F. Provide drain valve on each coil drain connection and a manual air vent for each vent connection. Pipe drains and vents to floor drain.

G. Seal all piping and conduit penetrations in casing air tight.

H. Lubricate bearings and belt as required.

3.02 ADJUSTMENT

A. Check and realign all access doors and dampers to ensure smooth operation throughout entire range of travel.

B. Adjust belt tension and alignment.

C. Adjust motor starter overloads as required. Replace overload when necessary to provide reliable starting and appropriate protection.

3.03 START-UP

A. Upon start-up, check fan rotation and take amperage measurement for each phase. Document initial amperage measurements and include in O&M manual. If amperage measurement exceeds 110% of motor nameplate, stop unit immediately and notify Engineer.

B. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan start-up inspections and testing is complete.

END OF SECTION

SECTION 23 82 27

CHILLED BEAMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Active Chilled Beams.

B. Passive Chilled Beams.

1.02 PRE-PURCHASED EQUIPMENT

A. Active chilled beams have been purchased by the Owner. Chilled beam information under PART 2 – PRODUCTS is provided for the Contractor's information.
   1. Owner will be responsible for arranging delivery and offloading Owner furnished equipment at the site.
   2. Contractor shall inspect the equipment to verify the condition of all components and report any shipping damage or other deficiencies prior to start of work. Start of work will signify that Contractor acknowledges that equipment is in good condition and ready for installation.
   3. Submittals will be furnished to Contractor when available.

PART 2 - PRODUCTS

2.01 ACTIVE CHILLED BEAMS

A. Trox or approved.

B. General: 22 gauge galvanized steel housing encasing two vertical integral sensible cooling coils and inlet plenum. Side-mounted spigot inlet connection. Each beam provided with pressure tap for airflow calibration and ½-inch NPT male piping connections. Linear slot style grille. Factory insulated supply plenum including separation between plenum and internal room airflow. Compatible with standard 1-inch wide inverted tee bar ceiling grid system or hard plaster ceiling where scheduled. Delivered to job site as a single unit. Similar to Trox DID300 series.

C. Provided as two-pipe or four-pipe as scheduled. Coils manufactured with ½-inch outside diameter copper tubing with minimum 0.16 inch wall thickness. Aluminum fins limited to no more than eight (8) fins per inch. Minimum working pressure 300 psi. Factory tested to 360 psi. Factory integrated drain fitting. Arrangement as shown on drawings.

D. Size and Performance: As scheduled.

2.02 PASSIVE CHILLED BEAMS

A. Acceptable Manufacturers: Trox or approved equal.

B. General: Similar to Trox Type PKV-R.

C. Description: Galvanized metal casing with aluminum frame for freely suspended arrangement. Galvanized perforated plate front cover. Heat exchanger with copper tubes and

pressed-on aluminum fins. Upward tube connections. Standard RAL 9010 (Pure white), gloss level 50%. Height adjustable suspension brackets.

D. Size and Performance: As scheduled.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Locate where shown on drawings and install in accordance with manufacturer's installation recommendations and equipment listings.

END OF SECTION

SECTION 25 10 00

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 for control of HVAC systems and equipment. Associated work includes but is not limited to:
   1. Modify and expand an existing. 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 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Control Contractor to coordinate with other trades to ensure delivery and correct installation of products furnished but not installed under this section. Coordination to include a review of schedule, manufacturer's installation requirements, and equipment locations. Such products include but are not limited to the following.
   1. Control Valves

1.03 PRODUCTS NOT FURNISHED OR INSTALLED BUT INTEGRATED WITH THE WORK OF THIS SECTION

A. Variable Frequency Drives. See SECTION 20 05 14 – MOTOR CONTROL DEVICES FOR MECHANICAL EQUIPMENT

1.04 RELATED SECTIONS

A. SECTION 25 30 00 – FIELD INSTALLED CONTROL SYSTEMS COMPONENTS

B. SECTION 25 90 00 - AUTOMATIC CONTROLS SEQUENCE OF OPERATIONS

1.05 PERFORMANCE REQUIREMENTS

A. Performance Standards
   1. Reporting Accuracy. The system shall report all values with an end-to-end accuracy no less than listed in Table 1.
   2. 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	±1°F
Ducted Air	±1°F
Dew Point	±3°F
Water Temperature	±1°F
Airflow (measuring stations)	±5% of full scale
Air Pressure (ducts)	±0.1 in. w.g.
Air Pressure (space)	±0.01 in. w.g.

TABLE 2
CONTROL STABILITY AND ACCURACY

Controlled Variable	*Control Accuracy*	*Range of Medium*
Air Pressure	±0.01 in. w.g.	0-6 in. w.g.
Airflow	±10% of full scale	-0.1 to 0.1 in. w.g.
Space Temperature	±2.0°F	
Duct Temperature	±3.0°F	
Fluid Pressure	±1.5 psi ±1.0 in. w.g.	1-150 psi 0-50 in. w.g. differential

1.06 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.

E. Controlled Systems:
   1. Provide a mounting, wiring, and routing plan-view drawing. Layout to account for HVAC, electrical, and other system design and layout requirements.
   2. Provide a complete description of the function of each controlled system including sequence of operation.
   3. 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.

1.07 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.

1.08 CLOSEOUT SUBMITTALS

A. Submit in accordance with SECTION 01 78 39 - PROJECT RECORD DOCUMENTS. Submit 14 days prior to final completion for approval.

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. A listing and documentation of all custom software created using the programming language including set points, tuning parameters, and object database.
   4. Supplemental Record Information
      a. One set of magnetic/optical media containing backup files of the software and database.
      b. One set of magnetic/optical media containing files of all color graphic screens created for the project.

1.09 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.

1.10 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 Apogee to match existing.

2.02 COMMUNICATIONS

A. Architecture: Match existing system architecture.

B. Contractor shall provide all communication media, connectors, repeaters, hubs, and routers necessary for network communications.

2.03 WORKSTATION GRAPHICS

A. System Graphics: Provide custom graphics files using existing graphics generator package.

2.04 SYSTEM APPLICATIONS SOFTWARE

A. General: Provide any additional systems application software required to provide the specified control functions.

2.05 WORKSTATION APPLICATION EDITORS

A. General: Provide any additional workstation Application Editors required to edit any applications that reside at system controllers.

2.06 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. It 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 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.

2.07 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.

2.08 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.

2.09 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.
4. The Controls Contractor is responsible for providing all controls required to control all products specified under Division 23 unless specifically stated elsewhere.
5. The Controls Contractor is responsible for the interface of all controls products included in Division 23 unless specifically stated elsewhere.

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 EXISTING EQUIPMENT

A. Existing Wiring: Contractor may reuse existing wiring provided the quality of the existing installation meets this specification. Verify the integrity of existing wiring and re-label in accordance with this specification. Remove wiring abandoned as the result of this work.

B. Local Control Panels: Contractor may reuse existing control cabinets to locate new equipment where existing cabinets are in good condition. Remove all redundant equipment within these cabinets. Patch face cover to fill all holes caused by removal of unused equipment.

C. Unless specifically stated elsewhere, Contractor is not responsible for the repair or replacement of existing control system equipment to be reused. Such equipment includes but is not limited to control devices, valves, dampers, or actuators. Should the Contractor find existing equipment requiring maintenance, Contractor shall notify the Owner immediately. Repair will be performed under separate Contract.

3.04 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.

3.05 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.”

3.06 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.

3.07 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.

3.08 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 provided 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.

G. Point Naming: Match Owner point naming standards.

3.09 GRAPHICS

A. Update existing graphics and provide new 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 chilled beam information on a “graphic” summary table. Provide dynamic information on each point shown.

3.10 CONTROL SYSEM 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

3.11 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.

3.12 TRAINING

1. Provide a minimum of 8 hours training to Owner's personnel in use and maintenance of BAS building management and control hardware and software as it relates to the project. Training shall be provided in two (2) sessions of 4 hours each. Sessions shall include instruction on site-specific programs, graphics, and user interfaces.

END OF SECTION

SECTION 25 30 00

FIELD INSTALLED CONTROL SYSTEM COMPONENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temperature Sensors and Transmitters

B. Air Pressure Transmitters

C. Dew-point Transmitters

D. Water Differential Pressure Transmitters

E. Relays and Switches

F. Automatic Dampers

G. Automatic Control Valves

H. Actuators

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Control Contractor to coordinate with other trades to ensure delivery and correct installation of products furnished but not installed under this section. Coordination to include a review of schedule, manufacturer's installation requirements, and equipment locations. Such products include but are not limited to the following.
   1. Control valves.
   2. Temperature sensor wells and sockets.
   3. Automatic dampers.

B. Control Contractor to provide all manufacturer's product information including recommended installation instructions to installing Contractor.

1.03 RELATED SECTIONS

A. SECTION 25 10 00 – BUILDING AUTOMATION SYSTEMS

B. SECTION 25 90 00 – AUTOMATIC CONTROLS SEQUENCE OF OPERATIONS

1.04 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.

PART 2 - PRODUCTS

2.01 TEMPERATURE SENSORS AND TRANSMITTERS

A. Temperature Sensors
   1. Acceptable Manufacturers: Mamac, Precon, or approved Direct Digital Control System manufacturer.
   2. Sensing element: Thermister type, +/- 0.5°F from 32°F to 150°F accuracy, less than 0.25°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 °F, wall mounted with vandal-resistant heavy plastic or stainless steel cover.
   4. Options: Match existing space and sensor options.

B. Temperature Transmitters
   1. Acceptable Manufacturer: Mamac, Precon, or approved Direct Digital Control System manufacturer.
   2. Sensing element: 100 ohm, platinum RTD, +/- 0.65°F @ 70°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 °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.
   7. Well Sensor: Aluminum or stainless steel sensor sheath, sensor probe length suitable for application. Brass or stainless steel thermal well rated to 250 psig and 250°F.

2.02 SPACE STATIC PRESSURE TRANSMITTERS

A. Acceptable Manufacturers: Mamac or approved equal

B. Solid state, capacitance sensor. Up to 10 PSID overpressure without zero shift. 4 to 20 ma output. 12 - 40 VDC supply voltage. Accuracy +/-1% of full scale. -0.05 to +0.05 sensor range. Similar to Mamac PR 274/275.

C. Accessories:
   1. Space Pressure Sensor: Ceiling mounted static space pressure sensor. Similar to Air Monitor Shielded Static Air Probe. Surface mounted.
   2. Outside Air Pressure Sensor. Similar to Air Monitor Static Outside Air Probe.

2.03 DEWPOINT TRANSMITTERS

A. Dew Point Transmitter:
   1. Acceptable Manufacturer: Rotronic,
   2. Sensor: Operating range 0 - 100 rh and -40 to 100°C.
   3. Accuracy: +/-0.8% rh.
   4. Output: 0-5 VDC, 4/20 mA linear output compatible with BAS manufacturer.
   5. Power Supply: 24 VAC supply voltage with input power isolation.
   6. Available in wall or duct mounted configurations. Similar to Rotonic, HygroFlex5 Series.

2.04 WATER DIFFERENTIAL PRESSURE TRANSMITTERS

A. Acceptable Manufacturer: Setra or approved equal.

B. Complete assembly consisting of sensing module, electronics housing, and piping connection manifold. The sensing module shall consist of an encapsulated sensing element and be AISI 316 stainless steel where it contacts the working fluid. NEMA Type 4 housing. Three valve manifold with 316 stainless steel vent and drain valves. 250 psi maximum working pressure, 20°F to 175°F operating temperature range. Accuracy shall be +/- 0.5 percent of calibrated span. 4-20 mA or 0-5 vdc output signal. Input range suitable for application. Similar to Setra Model DPT 230.

2.05 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.

B. Current Status Switches for Variable Frequency Drive Application
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 variable 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 5 A to 135 A and from 5 to 75 Hz.
5. Normally open current sensor output. 0.1A at 30 VAC/DC.
6. Similar to Hawkeye Model H904.

C. Low Temperature Limit Switch (Freeze Protection Relay)
1. Low temperature cutout relay. SPDT contact. Adjustable setpoint from 35 degrees F to 50 degrees F.
2. Fixed differential sensing element. Minimum 1 lineal foot of element per 1 square foot of coil area.
3. Manual reset.

2.06 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.

2.07 AUTOMATIC CONTROL VALVES

A. Acceptable Manufacturer: Belimo or approved BAS manufacturer.

B. General: Two-way or three-way type for two position or modulation service.

C. Close-off Pressure Rating: Valve trim and valve actuator furnished to provide the following minimum close-off pressure ratings
1. Water Valves:
   a. Two-way valves: 150% of total system (pump) head.
   b. Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system pump head.

D. Water Valves:
1. Two-way Modulating 2-inch and below: Fully proportional, modulating ball valve. Equal percentage flow characteristics. Brass body with nickel plating, stainless steel ball, fiberglass reinforced Teflon seats, blow out proof stem, TEF ZEL characterizing disc, stainless steel trim. 400 psi maximum rated pressure, 0-212^{o}F temperature rating, 200 psi close off pressure, 20 psi maximum operating differential pressure. Rangeability 500 to 1.
2. Two-way Modulating 2-1/2 inch and above: Fully proportional, modulating globe valve. Single-seat with equal percentage flow characteristics. Stainless steel or bronze trim, stainless steel stem, composition disc, replaceable bronze or stainless steel seats. ANSI Class 125, cast iron body, flanged ends.
3. Three-way Modulating 2-inch and below: Fully proportional, modulating ball valve. Equal percentage flow characteristics. Brass body with nickel plating, stainless steel ball, fiberglass reinforced Teflon seats, blow out proof stem, TEF ZEL characterizing disc, stainless steel trim. 400 psi maximum rated pressure, 0-212^{o}F temperature rating, 100 psi close off pressure each port, 50 psi maximum operating differential pressure. Rangeability 500 to 1. End position switches for normally open and normally closed port.
4. Three-way Modulating 2-1/2 inch and above: Fully proportional, three-way mixing globe valve. Linear flow characteristic each port. Bronze or stainless steel trim, bronze replaceable seats. ANSI Class 125, cast iron body, flanged ends.
5. Sizing Criteria: Size valves to provide CV scheduled on drawings. If CV is not scheduled, size valves as indicated below.
   a. Two-position service: Line size
   b. Two-way modulating service: Pressure drop equal to twice the pressure drop through the associated heat exchange device, 50% of the pressure difference between supply and return mains, or 5 psi, which ever is greater.
   c. Three-way modulating service: Line size.
6. Failure Mode:

a. Chilled Water Coils: Normally closed.
b. Other Applications: As scheduled or required by the Sequence of Operation.

2.08 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. Floating Point Control Actuators
1. Direct-coupled, floating point control, spring return fail-safe.
2. Tri-state binary input control application.
3. 24 VAC supply power.
4. Actuator shall have electronic overload or digital rotation circuitry to prevent damage to actuator through entire rotation range.
5. Provide manual override and visual position indicator.
6. Provide NEMA Type 2 enclosures.

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 transmitter for the following applications.
1. Ductwork Temperature with Averaging Sensor
2. Ductwork Temperature with Probe Sensor
3. Hydronic System Temperature with Probe Sensor

B. 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.

C. 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.

D. Ductwork Probe Temperature Transmitter: Size to position tip of probe in middle of air steam.

E. Hydronic System Temperature Transmitter:
1. Coordinate with Mechanical Contractor to ensure that associated temperature wells are installed where required and located for optimum sensing accuracy.

3.03 SPACE DEWPOINT SENSOR

A. Mount on wall where shown on drawings and 60 inches above finished floor level.

3.04 WATER DIFFERENTIAL PRESSURE TRANSMITTER

A. Install transmitter to measure pressure differential between supply and return piping approximately 2/3 of the distance from the pump outlet to the connection of the most distant chilled beam use.

B. Install transmitter within 60 inches of floor where possible. Provide piping and valves to drain and clean instrument piping.

3.05 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. Connect to Building Management System to provide freeze protection alarm.

3.06 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

3.07 AUTOMATIC VALVES

A. Install all slip-stem control valves with stem position no more than 60 degrees from vertical.

B. Locate to allow access and service. Ensure that actuator can be removed and services without interference from structure of other piping and equipment.

C. Provide unions on both sides of automatic control valves. Provide shut-off valves on both sides of automatic where valves cannot otherwise be isolated by local equipment shut-off valves.

3.08 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

SECTION 25 90 00

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.

C. All cascade control sequences and closed control loops shall have proportional-integral action and derivative capability, except where approved otherwise. No fixed-interval incremental resets are allowed.

PART 2 - PRODUCTS

2.01 NORTHEAST WING AIR HANDLING UNIT AHU-3

A. General: Constant volume dedicated outside air system, supply fan, heating coil, cooling coil, face and bypass damper, and outside air damper. 100% outside air.

B. Period of Operation: Operate supply fan through Auto-On-Off switch at variable speed drive as follows
1. Auto Position: Start/stop subject to Owner supplied operating schedule. Schedule shall include occupied and unoccupied times for each day, including holidays. Start unit at beginning of occupancy.
2. On Position: Override time schedule and start fan. Provide normal occupied period fan control sequences.
3. Off Switch Position: Fan off.

C. Occupied Period Control
1. Outside Air Damper: Open outside air damper prior to fan start. Close outside damper after fan stop. Provide delays to ensure fan does not operate with damper closed.
2. Modulate fan speed to maintain duct static pressure setpoint. Static pressure setpoint determined by Balancing Contractor. Initial setpoint 0.5 inches of water.
3. Discharge Temperature Control:
   a. Modulate heating and cooling output from a single control loop to maintain discharge air temperature setpoint.
   b. In heating mode, open the heating coil control valve 100%, and modulate the face and bypass damper to meet the discharge air temperature setpoint.
   c. In cooling mode, position face and bypass damper 100% to coil, and modulate the cooling coil control valve to meet the discharge temperature setpoint.

d. Reset discharge air temperature depending on chilled beam pump operation. If chilled beam pump is operating, reset the air handling unit discharge air temperature setpoint to maintain a discharge air temperature 6°F (adjustable from system graphic) less than the chilled beam water supply temperature setpoint. If the chilled beam pump is not operating, close cooling valve and maintain discharge air temperature of 65°F using heating control valve and face and bypass damper.

D. Unoccupied Period Control
1. Unit off, outside air damper closed, heating valve and cooling valve closed.

E. Safety Controls:
1. Freeze Protection:
   a. Hardware: Provide dual-contact, manual reset freeze protection relay directly interlocked to fan starter. Shut down unit when freeze protection relay indicates a temperature less than 36°F. Provide workstation alarm, and maintain alarm until acknowledged by operator.
   b. Fan Status: If a motor is commanded "on" and the motor status after a 20 second delay indicates that the motor is off, activate status alarm. Stop supply and exhaust fans. Associated valves and dampers set to unoccupied mode position. Maintain alarm until acknowledged by building operator.

F. Input/Output Points List:
1. Digital Inputs:
   a. Fan Status
   b. Freeze Protection Status
2. Digital Outputs
   a. Fan Start Stop
   b. Outside Air Damper
3. Analog Inputs
   a. Discharge Temperature
4. Analog Outputs
   a. Cooling Valve Control
   b. Heating Valve Control
   c. Face and Bypass Damper Control

2.02 NORTHEAST WING RADIANT SLAB TEMPERATURE CONTROL

A. General: Provide seasonal temperature control of existing radiant floor system. Maintain existing radiant floor supply temperature control sequences

B. Winter Operation: From start of November until the end of February, enable radiant system in heating mode one hour prior to occupancy until end of occupancy. Start and stop dates adjustable by system operator. Maintain existing building night low limit sequences.

C. Summer Operation: From start of May until the end of August, enable radiant system in cooling mode one hour prior to occupancy until end of occupancy. Start and stop dates adjustable by system operator.

D. Spring and Fall: For all other days, disable radiant system.

2.03 NORTHEAST WING SPACE TEMPERATURE CONTROL

A. General: 4-pipe active chilled beams and radiant heating and cooling floor system.

B. Space Temperature Control: During occupied hours, modulate chilled beam heating water valve and chilled water valves in sequence to maintain occupied setpoint. Close valves during unoccupied period.

C. Depending on radiant panel heating and cooling system mode, operate zone radiant panel valves as follows.
1. Radiant Panel Heating Mode: Modulate zone radiant panel valves along with zone chilled beam heating valves.
2. Radiant Panel Cooling Mode: Modulate zone radiant panel valves along with zone chilled beam cooling valves.
3. Radiant Panel Off Mode: Zone radiant valves to remain closed.

D. Input/Output Points List:
1. Maintain existing control points associated with room temperature sensing and radiant floor control.
2. Analog Outputs
   a. Chilled Beam Cooling Valve Control
   b. Chilled Beam Heating Valve Control

2.04 NORTHEAST WING EXHAUST

A. Input/Output Points List:
1. Analog Inputs
   a. First floor exhaust dewpoint
   b. Second floor exhaust dewpoint

2.05 EXISTING EXHAUST FAN EF-12

A. General: Variable volume exhaust fan to exhaust air from areas served by new air handling units AHU-3 and AHU-4.

B. Period of Operation: Period of Operation: Operate exhaust fan through Auto-On-Off switch at variable speed drive as follows
1. Auto Position: Start when either AHU-3 or AHU-4 is operating. Stop when both AHU-3 and AHU-4 are off.
2. On Position: Override time schedule and start fan. Provide normal occupied period fan control sequences.
3. Off Switch Position: Fan off.

C. Speed Control: Modulate fan speed to maintain static pressure setpoint in mechanical room A214. Setpoint determined by balancing Contractor. Initial setpoint -0.35 inches of water.

D. Input/Output Points List:
1. Maintain Existing Points
2. Analog Inputs
   a. Exhaust Fan Room Static Pressure

2.06 PRIMARY CHILLED WATER PUMP CWP-3

A. General: Chilled water pump with variable speed drive to serve AHU-3, AHU-4, and the Northeast Wing chilled beam system.

B. Period of Operation: Operate pump through Auto-On-Off switch at variable speed drive as follows:

1. Auto Position: Start pump when the chilled water control valve in AHU-3 or AHU-4 reaches 35% open or chilled beam pump CBP-1 is operating. Stop pump when control valves for AHU-3 and AHU-4 are less than 15% open and CBP-1 is off.
2. On Position: Override time schedule and start pump. Provide normal occupied period pump control sequences.
3. Off Switch Position: Pump off.

C. Pump Speed Control:
1. Modulate pump speed to maintain supply to return piping differential pressure setpoint. Differential pressure setpoint determined by Balancing Contractor.

D. Safety Controls:
1. Pump Status: If pump motor is commanded "on" and the motor status after a 20 second delay indicates that the motor is off, activate status alarm.

E. Input/Output Points List:
1. Digital Inputs:
   a. Pump Status
2. Digital Outputs
   a. Pump Start Stop
3. Analog Inputs
   a. Differential Pressure
4. Analog Outputs
   a. Pump Speed

2.07 NORTHEAST WING CHILLED BEAM PUMP CBP-1

A. General: Chilled water pump with variable speed drive to serve chilled beams located in the Northeast Wing.

B. Period of Operation: Operate pump through Auto-On-Off switch at variable speed drive as follows
1. Auto Position: Start pump when any chilled beam control valve reaches 35% open. Stop pump when all chilled beam control valves are less than 15% open.
2. On Position: Override time schedule and start pump. Provide normal occupied period pump control sequences.
3. Off Switch Position: Pump off.

C. Pump Speed Control:
1. Modulate pump speed to maintain supply to return piping differential pressure setpoint. Differential pressure setpoint determined by Balancing Contractor.

D. Safety Controls:

1. Pump Status: If pump motor is commanded "on" and the motor status after a 20 second delay indicates that the motor is off, activate status alarm.

E. Input/Output Points List:
1. Digital Inputs:
   a. Pump Status
2. Digital Outputs
   a. Pump Start Stop
3. Analog Inputs
   a. Differential Pressure
4. Analog Outputs

a. Pump Speed

2.08 HEATING WATER PUMP HWP-7 AND HWP-8

A. General: Constant speed heating water pumps to serve AHU-3, AHU-4, and chilled beams heating coils. Fully redundant requiring operation of only one pump at a time.

B. Period of Operation: Operate pump through Auto-On-Off switch at starter.
1. Auto Position: Start lead pump when the heating water control valve in AHU-3 or AHU-4 or any chilled beam heating control valve reaches 35% open. Stop lead pump when control valves for AHU-3, AHU-4, and all chilled beams are less than 20% open.
2. On Position: Override time schedule and start pump. Provide normal occupied period pump control sequences.
3. Off Switch Position: Pump off.
4. Lead/Lag Sequence: Alternate lead pump periodically as directed by Owner.

C. Safety Controls:
1. Pump Status: If lead pump motor is commanded "on" and the motor status after a 20 second delay indicates that the motor is off, stop lead pump, activate status alarm, and start lag pump. Maintain alarm until acknowledged by building operator.

D. Input/Output Points List:
1. Digital Inputs:
   a. Pump Status
2. Digital Outputs
   a. Pump Start Stop

2.09 CHILLED BEAM SUPPLY WATER TEMPERATURE CONTROL

A. When pump CBP-1 is operating, modulate chilled beam 3-way valve to maintain chilled beam supply water temperature at setpoint.
1. At start of AHU-3, set initial chilled beam supply temperature at 58^{o}F.
2. When all zone cooling loop outputs except two are less than 90%, reset the supply water temperature upward 1/2^{o}F every 10 minutes.
3. When five zone cooling loop outputs are at 100%, reset the supply water temperature downward 1/2^{o}F every 5 minutes.
4. Maintain a minimum supply temperature of 58^{o}F and a maximum supply temperature of 64^{o}F.

2.10 HEATING WATER SUPPLY TEMPERATURE

A. When heating water pump HWP-7 or HWP-8 is operating, modulate heating water 3-way valve to maintain heating water supply temperature at setpoint.
1. Reset supply water temperature to maintain the most open heating water valve at a 90% open position.

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

SECTION 26 01 26

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 Workman's qualifications
9 See individual sections for special requirements

1.04 SUBMITTAL SCHEDULE

Division 26 – Electrical	Codes
Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables	1,2
Section 26 05 33 - Raceways and Boxes for Electrical Systems	1,2
Section 26 24 16 – Panelboards	2,3,4
Section 26 28 16 - Overcurrent Protective Devices	2,3
Section 26 29 13 - Motor and Circuit Disconnects	2,3

PART 2 - PRODUCTS

2.01 THIS PART NOT USED

PART 3 - EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 26 05 00

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 bid 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

SECTION 26 05 01

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. 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.

D. Remove all abandoned wiring to leave site clean.

E. 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.

F. 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.

G. Verify with the General Contractor a location for storage of materials, supplies, tools, rubbish, etc. prior to start of work.

END OF SECTION

SECTION 26 05 19

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.

C. Branch Circuit Wiring: Conductors smaller than No. 12 AWG for power system branch circuits not permitted.

D. Motor control wires shall be No. 14 minimum.

E. Wire for special areas shall be as specified on the Drawings.

F. Cable between Variable Frequency Drive and motor: MC cable with 3 symmetrical ground wires, Type XHHW-2 conductors, continuous corrugated aluminum armor, and PVC jacket or as shown on Drawings.

2.02 VARIABLE FREQUENCY DRIVE CABLE

A. RoHS compliant, UL listed.

B. Three symmetrical bare copper grounds.

C. Two spiral copper tape shields (100% coverage)

D. Size per VFD manufacturer recommendations.

E. PVC jacketed.

F. Belden symmetrical design or approved.

2.03 TWIST-ON CONNECTOR

A. UL pressure-type, solderless, insulated, wound spring grip twist on connector.

B. Solderless pressure connectors for terminals, taps, and splices.

2.04 TERMINAL, CRIMP-ON

A. Flat, fork tongue, self-insulating.

C. For connection of stranded wire to screw terminals.

D. T & B "Sta-Kon," or 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

SECTION 26 05 26

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 2008 edition.

PART 2 - PRODUCTS

2.01 GROUNDING CONDUCTORS

A. Size: Grounding Electrode Conductor: 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.

END OF SECTION

SECTION 26 05 29

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

SECTION 26 05 33

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.

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.

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. 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.

C. 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.

D. 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

SECTION 26 05 53

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

SECTION 26 24 16

PANELBOARDS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Provide panelboards incorporating switching and protective devices of the number, rating and type specified herein and shown in Panel Schedules.

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI).
1. 67 Panelboards (ANSI/UL 67).
2. C37.20 Switchgear Assemblies Including Metal-Enclosed Bus (ANSI/IEE C37.20).

B. Institute of Electrical and Electronics Engineers (IEEE).
1. Std. 141-76 Electric Power Distribution for Industrial Plants.
2. Std. 241-74 Electric Systems for Commercial Buildings.

C. National Fire Protection Agency (NFPA).
1. NFPA 70 National Electrical Code.

D. Underwriters' Laboratory (UL).
1. U.L. 67 Panelboards.
2. U.L. 869 Service Disconnects.

1.03 QUALITY ASSURANCE

A. Coordination: Panelboard breakers shall be coordinated with feeder breakers in switchboard.

B. Acceptable Manufacturers: Cutler Hammer, Square D, or Approved.

PART 2 - PRODUCTS

2.01 CONSTRUCTION

A. Box:
1. Material: Galvanized code gauge steel.
2. Size: 20-inch minimum width; 4-inch minimum gutter space on all sides.
3. Mounting Studs: Minimum 4 interior.
4. Knockouts: Individual knockouts by manufacturer or field-cut by Contractor. No concentric knockouts.
5. Finish: Except for box, all exterior and interior steel surfaces properly cleaned and finished with industry standard gray baked enamel paint over a rust-inhibiting phosphatized primer coating approved by the paint manufacturer, except panelboards exposed in finished spaces shall have factory finish to match adjacent surfaces.

B. Bussing:
1. Material: Copper.
2. Tap Arrangement: Phase sequence type, permitting a two or three pole breaker to be installed at any location.

3. Short Circuit Bracing: Fully rated, 10,000 amperes RMS symmetrical minimum for 240V AC Panels, and minimum 14,000 amperes RMS Symmetrical for 480V AC Panels, or as otherwise noted.
4. Phase Bussing: Full height without reduction.
5. Neutral Bussing:
   a. Full size, unless otherwise noted.
   b. Suitable lug for each outgoing feeder requiring a neutral connection.
6. All bolts used to connect current-carrying parts together shall be accessible for tightening from the front of the panel.
7. Wiring terminals: Compression or set screw type for copper conductors; bolted to bus.

C. Trim:
1. Material: Code gauge steel.
2. Flush Panels: 3/4-inch minimum overlap all around.
3. Surface Panels: Same width and height as box.
4. Mountable by screwdriver, without need for special tools.
5. Tamper-proof: Trim shall not be removable with door closed. Adjustable indicating trim clamps shall be concealed inside door.
6. Trim shall have piano hinge down one side and shall be openable by removing crews. Dead front cover shall not open with trim.
7. Doors:
   a. Shall cover all device handles, except panels having individual metal clad externally operable dead front units.
   b. Hinges: Concealed, 5-knuckle, steel.
   c. Over 48-inches in Height: Shall have auxiliary fasteners at top and bottom of door in addition to flush latch (3-point).
   d. Latches:
      i. Flush, not protruding beyond front of door.
      ii. Spring-loaded door pull.
   e. Locks: Equip latches with flush locks keyed alike.

D. NEMA 1 unless otherwise noted or otherwise required per NEC for location installed.

2.02 CIRCUIT BREAKERS

A. Main Breaker:
1. Where required, main breakers shall be individually mounted separate from branch breakers.
2. Covered by a metal plate, except for the operating handle.
3. Connection from the load side to the panel bus shall be bus bar. Insulated wire not permitted.
4. Where used as service disconnect, breaker and panelboard shall be listed for use as service entrance equipment.

B. Branch Breakers:
1. Connection to Bus: Bolt-on.

C. Other requirements as noted elsewhere in these Specifications and as per NEC.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Provide mounting brackets, busbar drillings, and filler pieces for unused spaces.

B. Prepare and affix typed directory to inside cover of panelboard indicating loads controlled by each circuit as required elsewhere in these Specifications.

C. Provide panelboards flush in areas other than mechanical rooms, electrical rooms, and above removable ceilings.

D. Conduit shall be securely fastened to all panelboards and sheet metal outlet, junction, and pull boxes with galvanized locknuts, and one bushing installed in accordance with standard practice. The full number of threads shall project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be made up sufficiently tight to draw each into firm electrical contact with the box.

E. Keys: Collect all panel keys. Combine all keys on one key ring and submit at time of substantial completion.

END OF SECTION

SECTION 26 28 16

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. 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

SECTION 26 29 13

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.

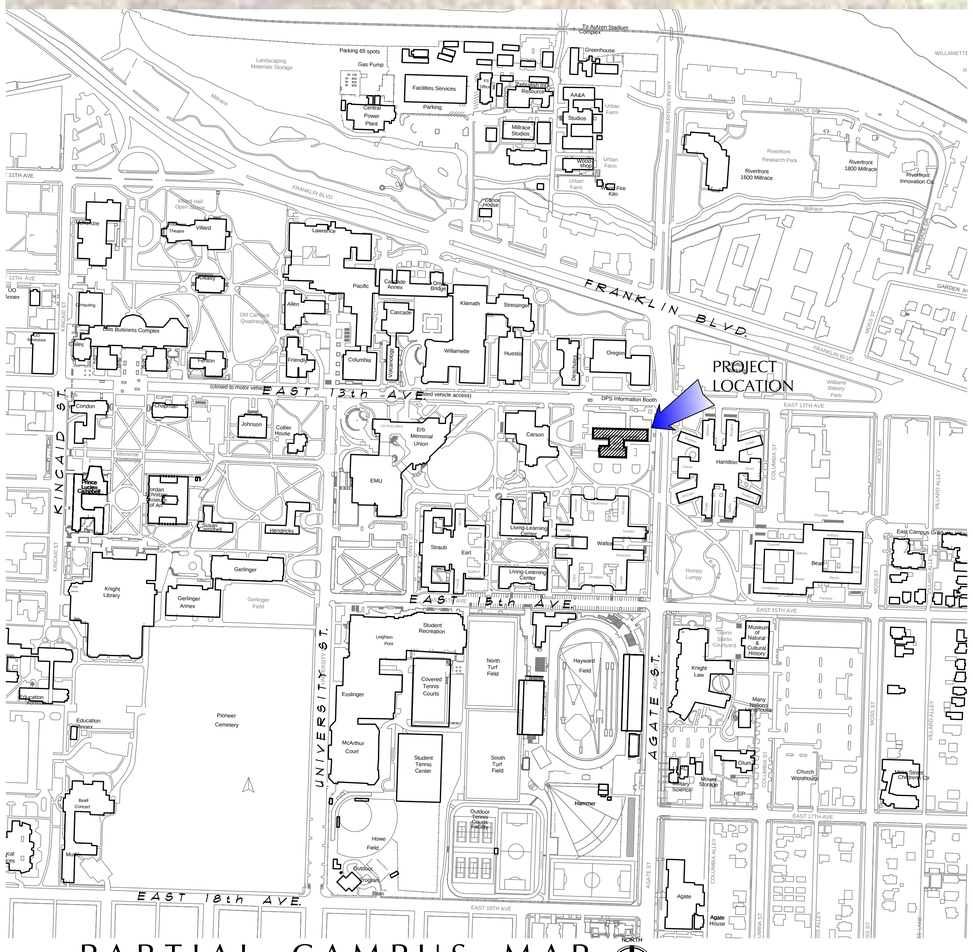
END OF SECTION

OREGON UNIVERSITY SYSTEM

UNIVERSITY OF OREGON HEALTH & COUNSELING CENTER

HVAC SYSTEM REPLACEMENT

EUGENE, OREGON



PARTIAL CAMPUS MAP

NTS

Construction Documents

FEBRUARY, 2012

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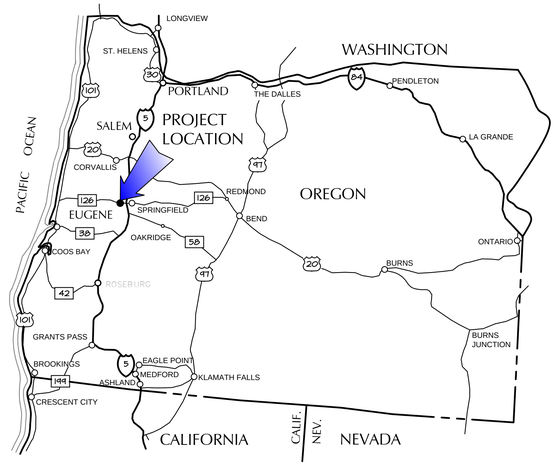

VICINITY MAP

NTS

NORTH

SHEET INDEX

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www.systemswestengineers.com

REGISTERED PROFESSIONAL ENGINEER 11,414 OREGON DEC. 3, 1985 STEVEN P. HOFFMAN EXPIRES: 6-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

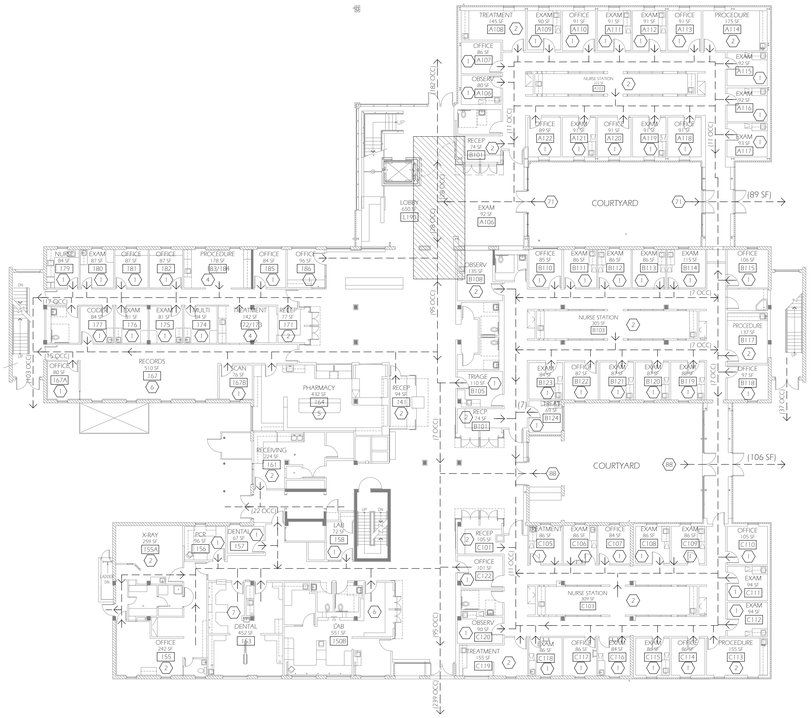
OWNER:
UNIVERSITY of OREGON

TITLE SHEET: VICINITY MAP, CAMPUS MAP, & SHEET INDEX

MARK DATE DESCRIPTION

DESIGNED MKB
DRAWN MKB
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

G-001
SHT 1 OF 28

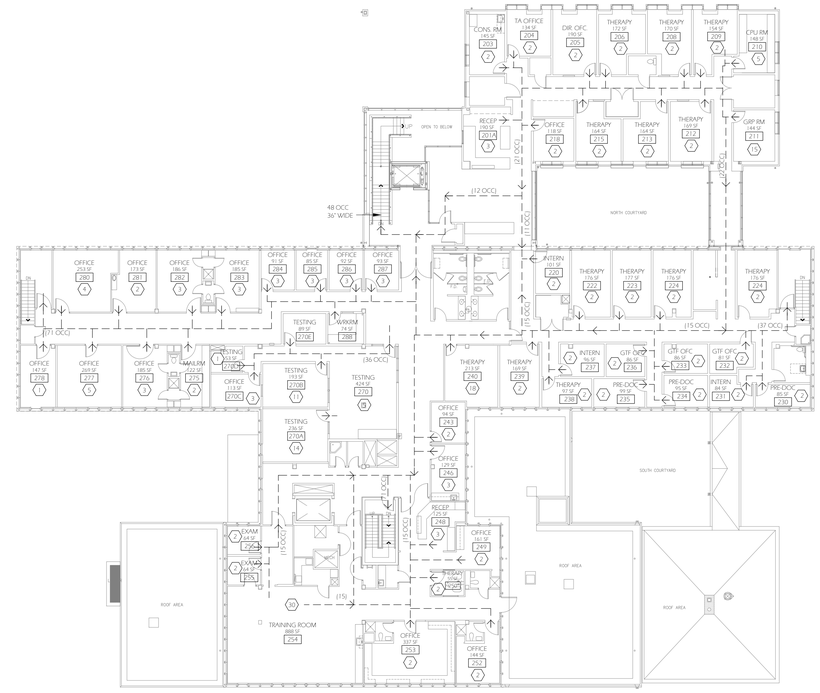


FIRST FLOOR PLAN – KEYED PLAN

SCALE: 1/8" = 1'-0"

1 A-001

NORTH



SECOND FLOOR PLAN – KEYED PLAN

SCALE: 1/8" = 1'-0"

2 A-001

NORTH

CODE SUMMARY: APPLICABLE CODES 2010 IBC W/ STATE OF OREGON AMENDMENTS

OCCUPANCY (Table 3-A)

BUSINESS GROUP — B
Clinic-outpatient, Laboratories, and Professional Services

CONSTRUCTION TYPE: — Type IIB

ALLOWABLE HEIGHT (Table 503): — 4 Stories / 55' Feet

EXISTING BUILDING HEIGHT: — 2 Story, 27'-2" Feet (T.O. PARAPET)

ADDITION PROPOSED HEIGHT: — 2 Story, 25'-0" Feet (T.O. RIDGE)

FIRE RESISTIVE REQUIREMENTS (Table 601)

Structural Frame	0 hr
Exterior bearing walls (1)	0 hr. (Table 602)
Interior bearing walls	0 hr
Non-bearing exterior wall (1)	0 hr. (Table 602)
Non-bearing interior walls	0 hr
Floors and floor - ceilings	0 hr
Roofs and roof - ceilings	0 hr
Exterior doors and windows	0 hr
Stairway construction	1 hr (1019.1)
Shaft enclosures	1 hr (707.4)
Shaft enclosures - ducted	0 hr (712.4.3.1)

(1) Distance to the assumed property line is 10 feet or greater in all cases. (Table 602)

ALLOWABLE BUILDING AREA	W/O Sprinklers	W/Sprinklers
Basic Allowable Area (B Occupancy)	23,000	23,000
100% Perimeter front public way/open space (Area x. 75)	17,250	17,250
Automatic Fire Sprinklers (Multi-story x 2)	0	46,000
Multi-Floor Increase (Area x 2)	40,250	86,250
Total Allowable Area	80,500	172,500

	Existing	New	Total
BASEMENT LEVEL Floor Area	8,565	0	8,565
LEVEL ONE Floor Area	16,185	6,285	22,470
LEVEL TWO Floor Area	13,280	4,230	17,510
TOTAL Area	38,030	10,515	48,545
Total Proposed Area w/o Basement			39,980

PLUMBING FIXTURE COUNT (CHAPTER 29)

48,545/100 occ/sf = 486 occupants, 243 female, 243 male

	REQUIRED	PROVIDED
WATER CLOSETS: 2/50 + 1/50x193 =	6 EACH	1 EACH LEVEL ONE + 3 EACH LEVEL TWO = 5 EACH; + 18 UNISEX
LAVS: 1/40 + 1/80x203 =	4 EACH	1 EACH LEVEL ONE + 3 EACH LEVEL TWO = 5 EACH; + 18 UNISEX
DRINKING FOUNTAINS: 1/100 =	5 TOTAL	1 EACH LEVEL ONE + 3 EACH LEVEL TWO = 5 EACH; + 18 UNISEX

LEGEND

AREA OF NEW CONSTRUCTION

PATH OF TRAVEL

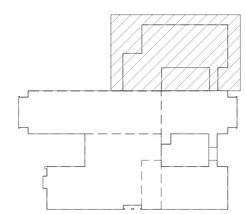
LOAD AT ROOM

(X OCC.) ACCUMULATIVE LOAD

Alternate Materials and Methods Submitted

Log No. 05-00592-01: Provide fully sprinklered building in lie of manual fire alarm system.

Log No. 05-00592-01: Provide residential model range in Basement Level Kitchen with non-ducted residential hood, due to incidental, non-commercial use.



KEY PLAN
NOT TO SCALE

SYSTEMS WEST ENGINEERS, INC.
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411 HIGH STREET
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5432
STATE OF OREGON

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

PHASE IV

CODE SUMMARY

MARK	DATE	DESCRIPTION

DESIGNED KS
DRAWN MNL
CHECKED KS
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

G-002

SHT 2 OF 29

SYMBOLS AND ABBREVIATIONS LEGEND

SYMBOLS

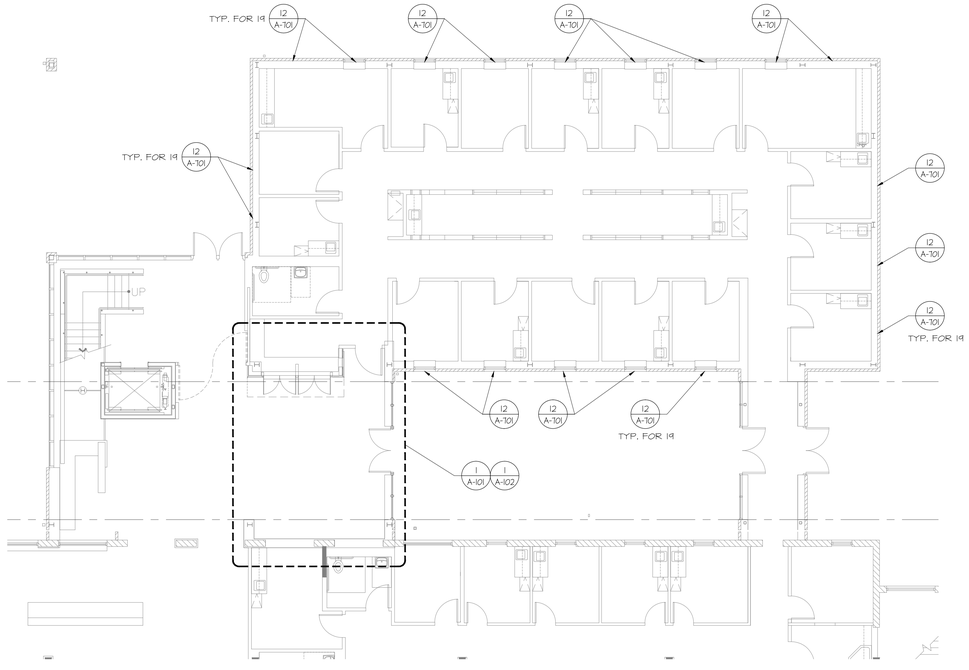
- XXX / XXX — BUILDING SECTION
- 21 — NOTE NUMBER
- X — KEYNOTE
- VERTICAL ELEVATION
- X — BUILDING GRID LINE
- X — WINDOW SYMBOL
- XXX / XXX / XXX — ROOM NAME AND NUMBER
- XXX-I — DOOR SYMBOL
- N / W X E / S — INTERIOR ELEVATION
- X — EQUIPMENT SYMBOL
- XXX / XXX — WALL SECTION
- N — NORTH ARROW
- XXX / XXX — DETAIL BUBBLE
- EGRESS PATH
- X — KEYED NOTES

ABBREVIATIONS

@	AT
AB	ANCHOR BOLT
AC	ASPHALTIC CONCRETE
ACOUS	ACOUSTIC
AGT	ACOUSTICAL TILE CEILING SYSTEM
AFF	ABOVE FINISH FLOOR
ALT	ALTERNATE, ALTERNATING
ALUM	ALUMINUM
BD	BOARD
BTWN	BETWEEN
BLDG	BUILDING
BO	BOTTOM OF
℄	CENTER LINE
CLG	CEILING
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
DBL	DOUBLE
DF	DRINKING FOUNTAIN
DIAG	DIAGONAL
Φ	DIAMETER
DISP	DISPENSER
DN	DOWN
DS	DOWNSPOUT
DTL	DETAIL
DWG	DRAWING
(E)	EXISTING
EA	EACH
EL. ELEV	ELEVATION
ELEC	ELECTRICAL
EQ	EQUAL
EXT	EXTERIOR
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FLOOR
FIN	FINISH/FINISHED
FO	FACE OF
FTG	FOOTING
GA	GAUGE
GB	GRAB BAR
GLB	GLUE LAM BEAM
GYP BD	GYPSUM BOARD
HC	HANDICAP
HGT	HEIGHT
HORIZ	HORIZONTAL
HS	HOLLOW STEEL
INSUL	INSULATION
INT	INTERIOR
IWP	INTERIOR WALL PANEL
LAV	LAVATORY
LOC	LOCATION
MAX	MAXIMUM
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED OWNER INSTALLED
OH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
P-#	PLUMBING FIXTURE
P LAM	PLASTIC LAMINATE
PT	PRESSURE TREATED
PLY	PLYWOOD
R	RADIUS
RB	RUBBER BASE
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
RM	ROOM
RO	ROUGH OPENING
RUB	RUBBER
SD	STORM DRAIN
SECT	SECTION
SHT	SHEET
SIM	SIMILAR
SPECS	SPECIFICATIONS
SQ	SQUARE
SQFT, SF	SQUARE FOOT
S STL	STAINLESS STEEL
STD	STANDARD
STL	STEEL
STRUC	STRUCTURAL
SUSP	SUSPENDED
SV	SHEET VINYL
T&B	TOP & BOTTOM
T&G	TONGUE & GROOVE
TEMP	TEMPERED, TEMPORARY
TO	TOP OF
TOC	TOP OF CONCRETE
TOM	TOP OF MASONRY
TOW	TOP OF WALL
TOS	TOP OF STRUCTURE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VCT	VINYL COMPOSITION TILE
VEN	VENEER
VER, VFY	VERIFY
VERT	VERTICAL
VEST	VESTIBULE
VIF	VERIFY IN FIELD
WA	WALL ASSEMBLY
W/	WITH
WD	WOOD
WDW	WINDOW
WP	WATER PROOF

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH LOCAL CODES, OREGON STATE CODES, AMENDMENTS, RULES, REGULATIONS, ORDINANCES, LAWS, ORDERS, APPROVALS, ETC. THAT ARE REQUIRED BY GOVERNING AUTHORITIES. IN THE EVENT OF CONFLICT, THE MOST STRINGENT REQUIREMENTS SHALL APPLY. REQUIREMENTS INCLUDE, BUT ARE NOT LIMITED TO, THE CURRENTLY APPLICABLE EDITIONS OR PUBLICATIONS OF THE FOLLOWING:
   1. 2007 EDITION OSSC
   2. OREGON ADMINISTRATIVE CODE
   3. NATIONAL FIRE PROTECTION ASSOCIATION
   4. STATE OF OREGON 2005 ELECTRICAL SPECIALTY CODE
   5. STATE OF OREGON 2005 PLUMBING SPECIALTY CODE
   6. STATE OF OREGON 2007 MECHANICAL SPECIALTY CODE
   7. STATE OF OREGON 2004 FIRE CODE
2. CONTRACTOR SHALL EXAMINE AND VERIFY CONDITIONS OF THE JOB SITE. ANY DISCREPANCIES BETWEEN DRAWINGS AND EXISTING CONDITIONS SHOULD BE RECORDED IN WRITING AND REPORTED TO THE ARCHITECT FOR RESOLUTION PRIOR TO COMMENCEMENT OF WORK.
3. ALL DIMENSIONS NOTED IN FLOOR PLANS AND SECTIONS ARE TO FINISH UNLESS NOTED OTHERWISE. NOTIFY ARCHITECT OF ANY DISCREPANCIES OR CONFLICT PRIOR TO SUBSEQUENT WORK.
4. DO NOT SCALE DRAWINGS.
5. MATERIAL CHOICES, FIXTURES, ADHESIVES, AND FINISHES NOT SPECIFIED SHALL BE PRE-APPROVED BY OWNER AND ARCHITECT.
6. ALL CHANGE ORDERS SHALL BE WRITTEN AND SHALL BE APPROVED BY ARCHITECT AND OWNER PRIOR TO EXECUTION OF WORK.
7. WOOD IN CONTACT WITH CEMENT OR MASONRY SHALL BE PRESSURE TREATED.
8. PROVIDE ACCESS TO CONCEALED VALVES, DAMPERS, CONTROLS, ELECTRONIC JUNCTION BOXES, ETC. OBTAIN ARCHITECTS APPROVAL IN LOCATING ACCESS DOORS PRIOR TO INSTALLING
9. PIPING, CONDUIT, ROUGH-IN AND SIMILAR WORK SHALL BE CONCEALED UNLESS NOTED OTHERWISE.
10. SITE TO BE BROOM CLEANED AT END OF DAY DAILY.



FIRST FLOOR PLAN - KEYED PLAN — 1 / A-001

SCALE: 1/8" = 1'-0"

NORTH

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REGISTERED ARCHITECT — KEVIN SPAHN — EUGENE, OREGON 5632 — STATE OF OREGON

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

PHASE IV

KEY PLAN
NOT TO SCALE

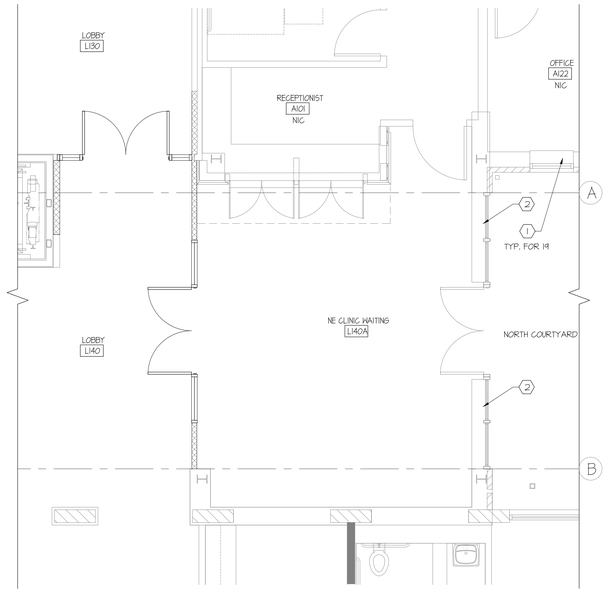
KEYED PLANS

MARK	DATE	DESCRIPTION
■		

DESIGNED	KS
DRAWN	MNL
CHECKED	KS
SCALE	AS SHOWN
■	
DATE	13FEB2012
PROJECT	K010.06

A-001

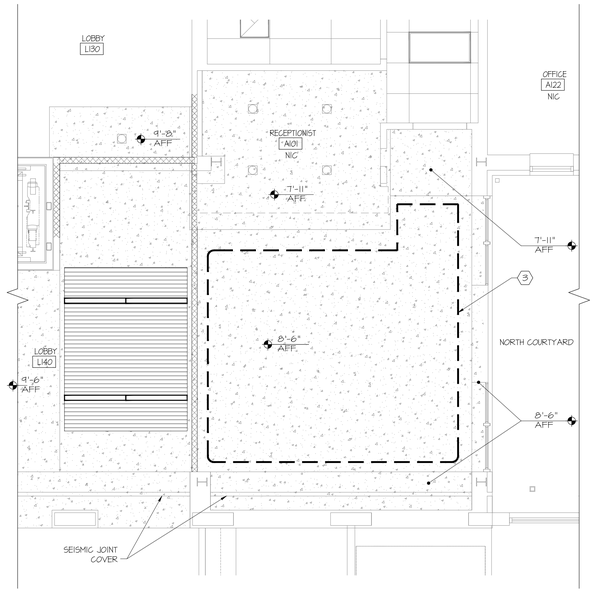
SHT 3 OF 29



FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

1
A-101



FIRST FLOOR REFLECTED CEILING DEMO PLAN

SCALE: 1/4" = 1'-0"

2
A-101

GENERAL NOTES

1. SEE SHEET A-601 FOR WALL AND CEILING ASSEMBLIES.
2. 6. COORDINATE ALL MECHANICAL AND ELECTRICAL FITTINGS OR FIXTURES WITHIN REQUIRED AREAS OR SPACES

KEYED NOTES

1. MODIFY EXISTING DAMPER ASSEMBLY TO PROVIDE WEATHERTIGHT ASSEMBLY. EXISTING EXTERIOR GRILL AND INTERIOR LOUVER TO REMAIN. TYPICAL FOR 43 LOCATIONS. SEE 12/A-701
2. EXISTING DAMPER ASSEMBLY TO REMAIN, TYPICAL FOR TWO LOCATIONS AT LOBBY L140A.
3. REMOVE SUSPENDED GYPSUM BOARD CEILING IN LOBBY L140 TO ALLOW INSTALLATION OF NEW MECHANICAL DUCTWORK, COORDINATE WITH MECHANICAL DRAWINGS. EXTENTS ON THIS DRAWING SHOWN FOR REFERENCE ONLY.

LEGEND

EXISTING GYPSUM BOARD CEILING TO BE REMOVED

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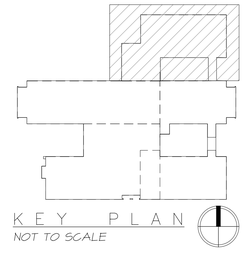


KEY PLAN

NOT TO SCALE

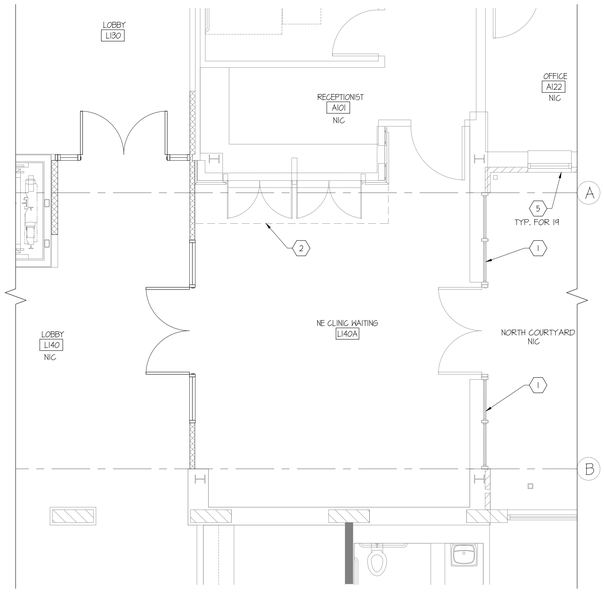
FIRST FLOOR DEMOLITION PLANS

MARK	DATE	DESCRIPTION
■		

DESIGNED	KS
DRAWN	MNL
CHECKED	KS
SCALE	AS SHOWN
■	
DATE	13FEB2012
PROJECT	K010.06

A-101

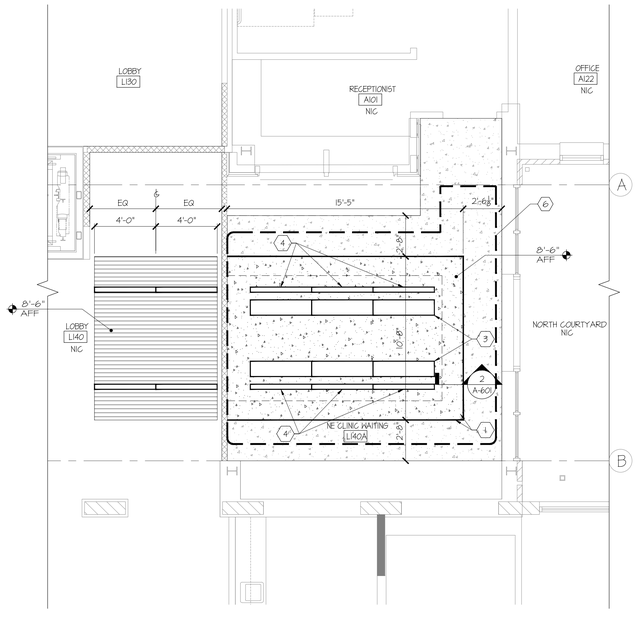
SHT 4 OF 29



FIRST FLOOR NEW WORK PLAN

SCALE: 1/4" = 1'-0"

1
A-102



FIRST FLOOR REFLECTED CEILING NEW WORK PLAN

SCALE: 1/4" = 1'-0"

2
A-102

GENERAL NOTES

1. SEE SHEET A-601 FOR WALL AND CEILING ASSEMBLIES.
2. ALL DIMENSIONS SHOWN ARE TO FACE OF FINISH AS SHOWN ON WALL TYPE U.N.O.
3. COORDINATE ALL MECHANICAL AND ELECTRICAL FITTINGS OR FIXTURES WITHIN REQUIRED AREAS OR SPACES
4. ALL STRUCTURE, DUCTWORK, PIPING, ETC. ABOVE WOOD CEILINGS ARE CONSIDERED EXPOSED, AND SHALL BE PAINTED. SEE FINISH SCHEDULE AND SPECIFICATIONS
5. REFER TO ELECTRICAL LIGHTING DRAWINGS FOR SPECIFIC LIGHT FIXTURE TYPES AND FOR FIXTURES NOT SHOWN ON THIS PLAN
6. ALIGN ALL LIGHT FIXTURES, SPEAKERS, SMOKE DETECTORS, DIFFUSERS, ETC. A INDICATED. VERIFY PLACEMENT OF ALL DEVICES AND FIXTURES NOT SHOWN.

KEYED NOTES

1. INFILL AT EXISTING WALL FILTER, SEE DETAIL 3/A-601
2. CANTILEVERED CEILING TO REMAIN
3. 4'-0" ACTIVE CHILLED BEAM, SEE MECHANICAL, OFCI
4. FLUORESCENT LINEAR RECESSED FIXTURE, REFER TO ELECTRICAL DRAWINGS, OFCI
5. MODIFY EXISTING DAMPER ASSEMBLY, SEE 12/A-701
6. SUSPENDED GYPSUM BOARD CEILING, SEE 1/A-601

LEGEND

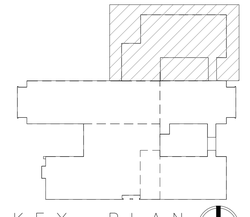
NEW SUSPENDED GYPSUM BOARD CEILING

EXISTING SUSPENDED GYPSUM BOARD CEILING

LIGHT FIXTURE, RE: ELEC.

HVAC GRILL, RE: MECH.

PHASE IV



KEY PLAN

NOT TO SCALE

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5432
STATE OF OREGON

29

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

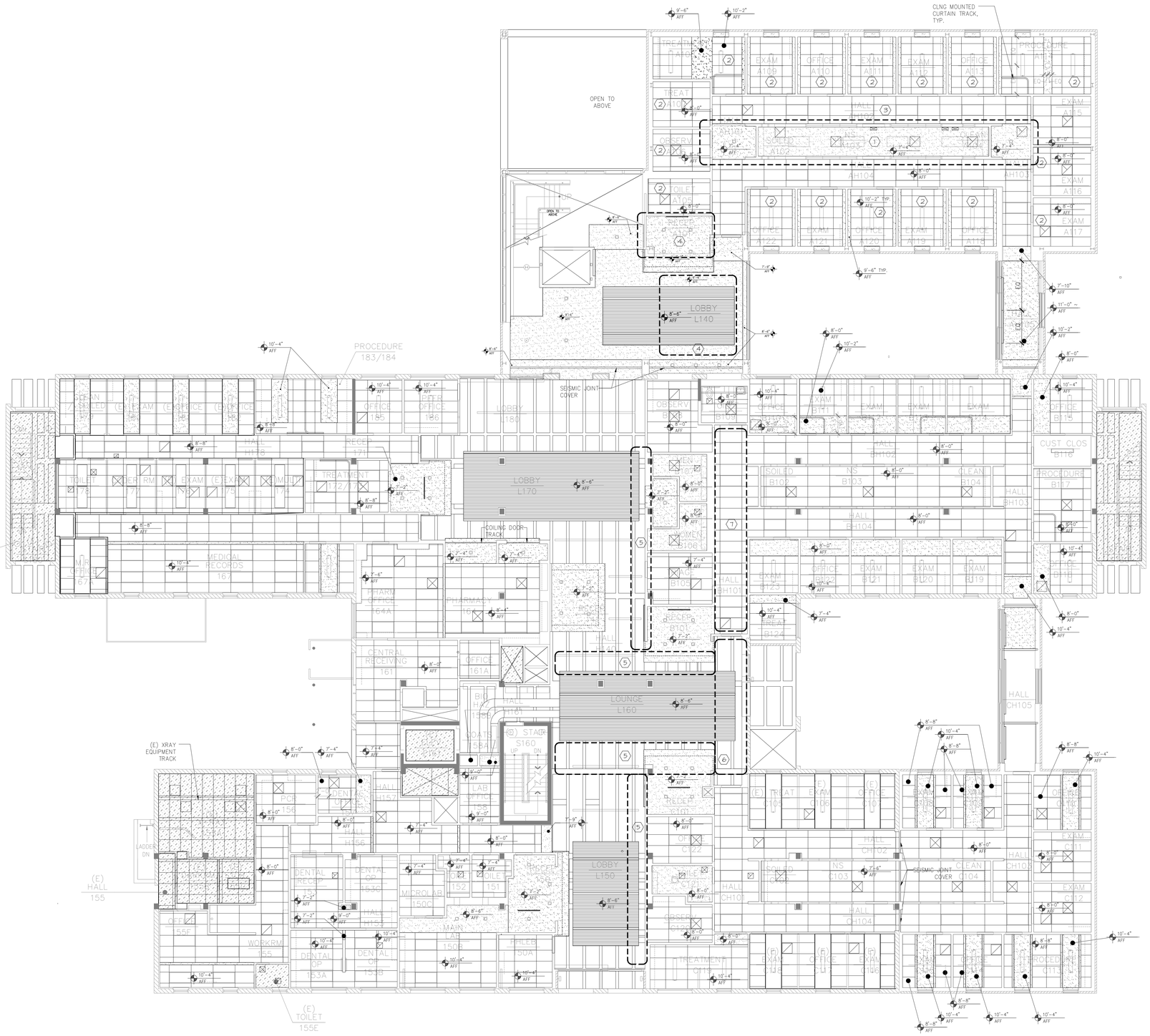
FIRST FLOOR NEW WORK PLANS

MARK	DATE	DESCRIPTION
■		

DESIGNED	KS
DRAWN	MNL
CHECKED	KS
SCALE	AS SHOWN
■	
DATE	13FEB2012
PROJECT	K010.06

A-102

SHT 5 OF 29



FIRST FLOOR REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"

1
A-201

GENERAL NOTES:

1. EXTENT OF DEMOLITION REQUIRED TO PERFORM WORK TO OUTLINED IN MECHANICAL DRAWINGS TO BE COORDINATED BETWEEN GENERAL CONTRACTOR AND MECHANICAL CONTRACTOR AS PART OF BASE BID WORK.

KEYED NOTES

1. SELECTIVE DEMOLITION OF HARD CEILING FOR MECHANICAL REVISION AS INDICATED ON M-101. REINSTALL TO MATCH EXISTING CONDITIONS.
2. SELECTIVE REMOVAL OF ACOUSTICAL CEILING TILE FOR INSTALLATION OF NEW 4" Ø DUCTWORK. MODIFY CEILING GRID AND TILE FOR INSTALLATION OF NEW CHILLED BEAM. REINSTALL TO MATCH EXISTING CONDITIONS.
3. SELECTIVE REMOVAL OF ACOUSTICAL CEILING TILE AND MODIFICATION OF CEILING GRID TO ALLOW INSTALLATION OF DUCTWORK. REINSTALL TO MATCH EXISTING CONDITIONS.
4. SELECTIVE DEMOLITION OF HARD CEILING FOR NEW CHILLED BEAM. REINSTALL TO MATCH EXISTING CONDITIONS.
5. INSTALLATION OF NEW DUCTWORK TO SERVE LOBBY AND LOUNGE AREA. REMOVE AND REINSTALL EXISTING CLOUD SYSTEM AS REQUIRED FOR MECHANICAL SYSTEM INSTALLATION. PAINT EXPOSED DUCTWORK.
6. INSTALLATION OF NEW PIPING (CWS, CWR, HS AND HR)
7. SELECTIVE REMOVAL OF ACOUSTICAL CEILING TILE FOR INSTALLATION OF NEW PIPING (CWS, CWR, HS AND HR).

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EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

PHASE IV

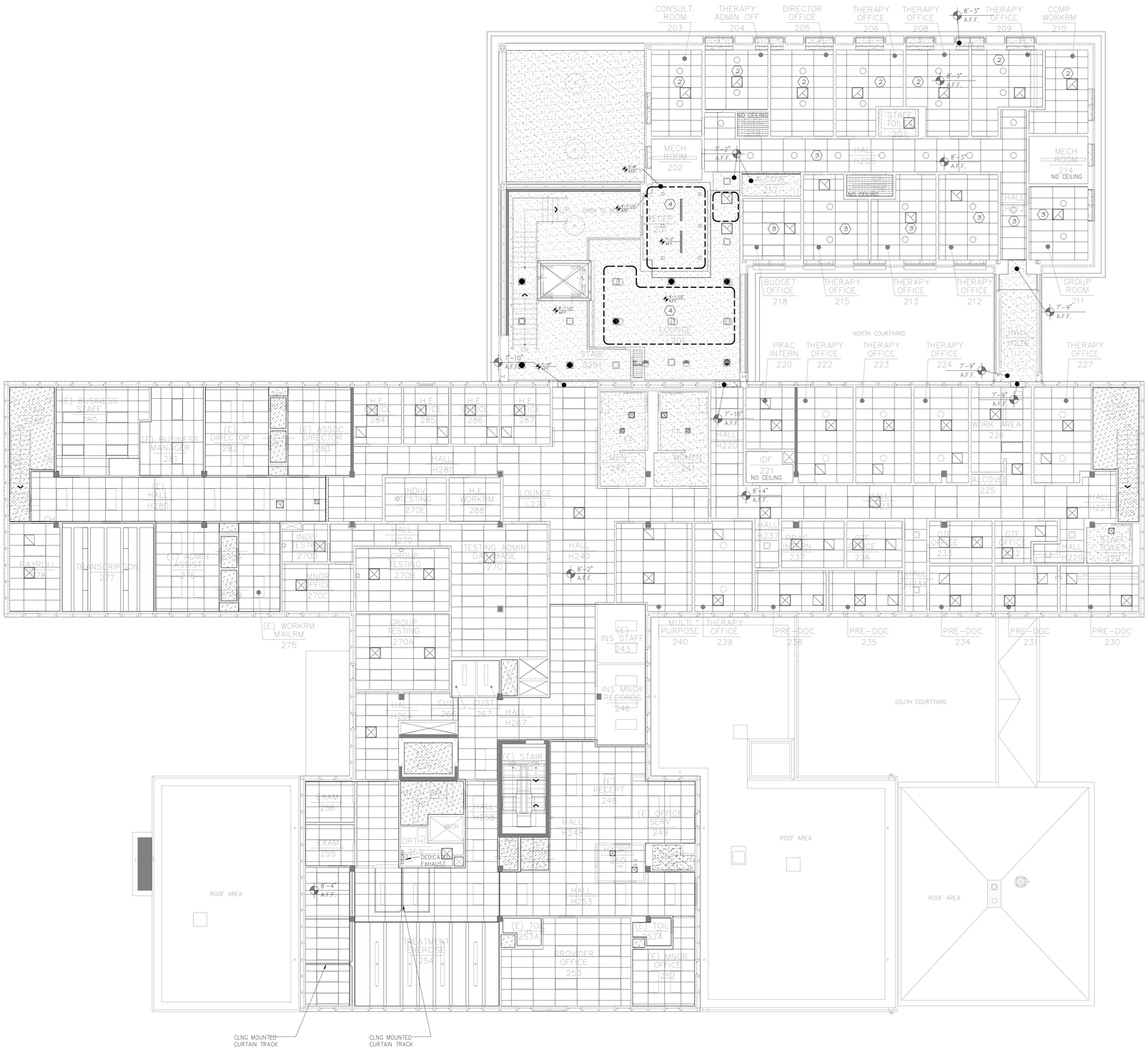
FIRST FLOOR OVERALL REFLECTED CEILING PLAN

MARK	DATE	DESCRIPTION

DESIGNED	KS
DRAWN	MNL
CHECKED	KS
SCALE	AS SHOWN
DATE	13FEB2012
PROJECT	K010.06

KEY PLAN
NOT TO SCALE

A-201
SHT 6 OF 29



SECOND FLOOR REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"

1
A-201

GENERAL NOTES:

1. EXTENT OF DEMOLITION REQUIRED TO PERFORM WORK TO OUTLINED IN MECHANICAL DRAWINGS TO BE COORDINATED BETWEEN GENERAL CONTRACTOR AND MECHANICAL CONTRACTOR AS PART OF BASE BID WORK.

KEYED NOTES

1. SELECTIVE DEMOLITION OF HARD CEILING FOR MECHANICAL REVISION AS INDICATED ON M-101. REINSTALL TO MATCH EXISTING CONDITIONS.
2. SELECTIVE REMOVAL OF ACOUSTICAL CEILING TILE FOR INSTALLATION OF NEW 4" Ø DUCTWORK. MODIFY CEILING GRID AND TILE FOR INSTALLATION OF NEW CHILLED BEAM. REINSTALL TO MATCH EXISTING CONDITIONS.
3. SELECTIVE REMOVAL OF ACOUSTICAL CEILING TILE AND MODIFICATION OF CEILING GRID TO ALLOW INSTALLATION OF DUCTWORK. REINSTALL TO MATCH EXISTING CONDITIONS.
4. SELECTIVE DEMOLITION OF HARD CEILING FOR NEW CHILLED BEAM. REINSTALL TO MATCH EXISTING CONDITIONS.
5. INSTALLATION OF NEW DUCTWORK TO SERVE LOBBY AND LOUNGE AREA. REMOVE AND REINSTALL EXISTING CLOUD SYSTEM AS REQUIRED FOR MECHANICAL SYSTEM INSTALLATION. PAINT EXPOSED DUCTWORK.
6. INSTALLATION OF NEW PIPING (CWS, CWR, HS AND HR)
7. SELECTIVE REMOVAL OF ACOUSTICAL CEILING TILE FOR INSTALLATION OF NEW PIPING (CWS, CWR, HS AND HR).

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PHASE IV

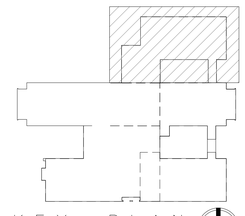
SECOND FLOOR OVERALL REFLECTED CEILING PLAN

MARK	DATE	DESCRIPTION
■		

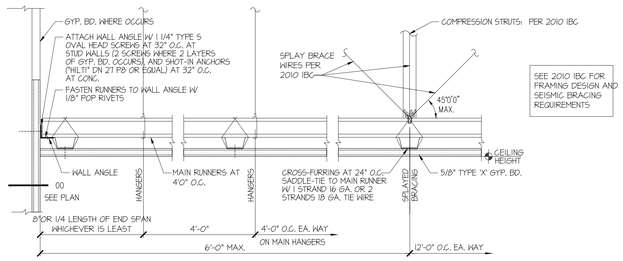
DESIGNED	KS
DRAWN	MNL
CHECKED	KS
SCALE	AS SHOWN
■	
DATE	13FEB2012
PROJECT	K010.06

A-202

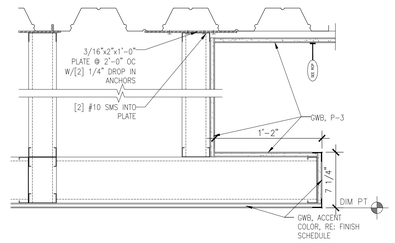
SHT 7 OF 24



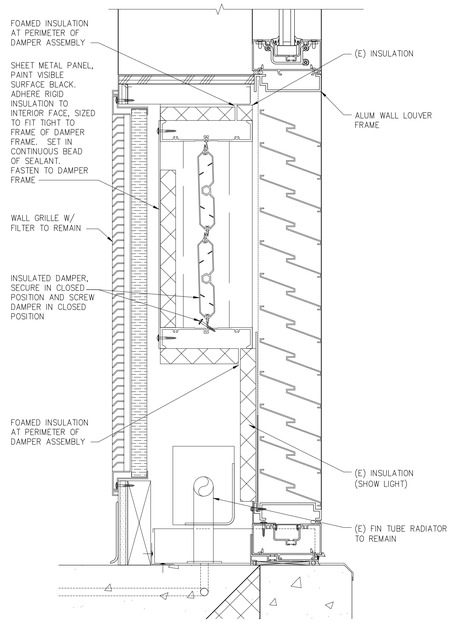
KEY PLAN
NOT TO SCALE



1 SUSPENDED GYPSUM BOARD CEILING
SCALE: 1-1/2" = 1'-0"



2 CANTILEVERED SOFFIT
SCALE: 1 1/2" = 1'-0"



NOTE TO CONTRACTOR:
CONTRACTOR MAY, AT THEIR DISCRETION ELECT TO COMPLETELY REMOVE DAMPER ASSEMBLY AND SEAL AND INSULATE DIRECTLY TO EXTERIOR ALUMINUM WALL LOUVER. REMOVAL OF DAMPER ASSEMBLY WILL REQUIRE DISCONNECTING EXISTING ELECTRICAL CONNECTION

3 DAMPER INFILL
SCALE: 3" = 1'-0"

SCHEDULES

FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR	BASE	WALL				CEILING	REMARKS
				N	E	S	W		
L140A	NE CLINIC WAITING	NIC	WB-1	P-1J	P-1J	P-1J	P-1J	P-2J	1

FINISH LEGEND

ACT CEILING	ACOUSTICAL
CPT	CARPET
(E)	EXISTING TO REMAIN
LWC CEILING	LINEAR WOOD
P	PAINT
RB	RUBBER BASE
VCT TILE	VINYL COMPOSITE
CFT	CONCRETE FLOOR
WB	WOOD BASE
WSG	WOOD GRILLE

PAINTING SYSTEM TYPE LEGEND

REFER TO SPEC SECTION 09 90 00

REMARKS

1 REFER TO DRAWINGS FOR CEILING PATTERN

GENERAL NOTES

1 ALL METAL SURFACES TO BE PAINTED

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PHASE IV

SCHEDULES AND DETAILS

MARK DATE DESCRIPTION

DESIGNED KS
DRAWN MNL
CHECKED KS
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

A-601
SHT 8 OF 24

SYMBOLS AND ABBREVIATIONS LEGEND

PIPING

SYMBOL	ABBREV.	DESCRIPTION
		PIPING UP
		PIPING DOWN
CWS	CWS	CHILLED WATER SUPPLY
CWR	CWR	CHILLED WATER RETURN
CBS	CBS	CHILLED BEAM SUPPLY
CBR	CBR	CHILLED BEAM RETURN
HS	HS	HEATING WATER SUPPLY
HR	HR	HEATING WATER RETURN
CD	CD	CONDENSATE DRAIN

SYMBOL	ABBREV.	DESCRIPTION
		CAPPED PIPE
		BALL VALVE
	BFLY	BUTTERFLY VALVE
	CV	CHECK VALVE
	GV	GATE VALVE
	P	PUMP
		WYE STRAINER
	FD	FLOOR DRAIN
	DV	DRAIN VALVE
		UNION
		PIPE REDUCING FITTING: EXIST, NEW
		THERMOMETER
		PRESSURE GAUGE
		TEST PLUG
		DIRECTION OF FLOW
A	AV	TWO-WAY AUTOMATIC VALVE
A		THREE-WAY AUTOMATIC VALVE
	FMS	FLOW MEASURING & BALANCING VALVE
		ECCENTRIC PLUG VALVE
	FCV	FLOW CONTROL VALVE
		WATER HAMMER ARRESTOR
FS		FLOW SWITCH
RPBP		REDUCED PRESSURE PRINCIPAL BACKFLOW PREVENTER
CFR		CONSOLIDATED FITTING RETURN
CFS		CONSOLIDATED FITTING SUPPLY
		PRESSURE & TEMPERATURE RELIEF VALVE
		FLEXIBLE PIPE CONNECTION
		AIR VENTS: MANUAL, AUTOMATIC
	WH	WALL HYDRANT
		PUMP SUCTION DIFFUSER
		VENTURI
W		SENSOR WELL
		METER
		PRESSURE RELIEF VALVE

DUCTWORK

DOUBLE-LINE SYMBOL	SINGLE-LINE SYMBOL	DESCRIPTION
	SA	RECTANGULAR SUPPLY AIR DUCT UP
	EA, OSA, or RA	RECTANGULAR EXHAUST AIR, OUTSIDE AIR, OR RETURN AIR DUCT UP
	SA	RECTANGULAR SUPPLY AIR DUCT DOWN
	EA, OSA, or RA	RECTANGULAR EXHAUST AIR, OUTSIDE AIR, OR RETURN AIR DUCT DOWN
		ROUND DUCTWORK UP
		ROUND DUCTWORK DOWN
		TURN VANE ELBOW
		STANDARD RADIUS ELBOW
		FLEXIBLE DUCT CONNECTION
12x6	12x6	DUCT SIZE: WIDTH x DEPTH
CD-1 (OBD) 6x6-3W 100		CEILING SUPPLY AIR DIFFUSER-TYPE (OPPOSED BLADE DAMPER) NECK SIZE - BLOW PATTERN (IF NOT 4-WAY) AIR VOLUME IN CUBIC FEET per MINUTE (CFM)
10x6 200		CEILING EXHAUST OR RETURN GRILLE SIZE AIR VOLUME IN CUBIC FEET per MINUTE (CFM)
10x6 200		WALL SUPPLY OR RETURN GRILLE SIZE AIR VOLUME IN CUBIC FEET per MINUTE (CFM)
		SOUND ATTENUATED DUCTWORK
		EXTERNAL DUCT INSULATION WITH VAPOR BARRIER
		MANUAL VOLUME DAMPER
		AUTOMATIC DAMPER
F		FIRE DAMPER
S		SMOKE DAMPER
D		SMOKE DETECTOR D= DUCT DETECTOR
		CONCENTRIC TRANSITION
		ECCENTRIC TRANSITION
RECT. ROUND		RECTANGULAR TO ROUND TRANSITION
		90deg HEEL TAP TAKEOFF (SUPPLY OR RETURN RECTANGULAR DUCT)
		ROUND SPIN IN CONNECTION TO (RECTANGULAR DUCT)
		45deg LATERAL BRANCH (ROUND OR FLAT OVAL DUCTS)

CONTROLS

SYMBOL	DESCRIPTION
- - - -	ELECTRIC SIGNAL
S	ROOM SENSOR
H	ROOM HUMIDITY SENSOR
T_T	TRANSMITTER CO_2= CARBON DIOXIDE D= DEWPOINT DP= DIFFERENTIAL F= FLOW HP= HIGH PRESSURE KW= KILOWATTS LP= LOW PRESSURE P= PRESSURE T= TEMPERATURE
R_C	RELAY ADD= ADDING; MAX= MAXIMUM POSITION AVE= AVERAGE; MIN= MINIMUM POSITION C= ELECTRIC CURRENT; R= RATIO DP= DIFFERENTIAL PRESSURE; REV= REVERSING FP= FREEZE PROTECTION; S= SWITCH HP= HIGH PRESSURE; SUB= SUBTRACTING L= LOW SELECTOR; TS= TAMPER SWITCH M= MANUAL
A_E	ACTUATOR E= ELECTRIC P= PNEUMATIC EES= ELECTRIC WITH END SWITCH
S_T	SENSOR DP= DIFFERENTIAL PRESSURE F= FLOW P= PRESSURE T= TEMPERATURE

SYMBOL	DESCRIPTION
	AUTOMATIC DAMPER
W	SENSOR WELL
FS	FLOW SWITCH
AI ALARM	BMCS INPUT/OUTPUT POINT AI= ANALOG INPUT AO= ANALOG OUTPUT DI= DIGITAL INPUT DO= DIGITAL OUTPUT S= SERIAL CONNECTION S/S= START/STOP FUNCTION DESIGNATION
C_TU	CONTROLLER TUC= TERMINAL UNIT CONTROLLER
CWP-2	MOTOR STARTER (W/ EQUIPMENT INDICATED UNDERLINED)
BCP CWP-2	EQUIPMENT CONTROL PANEL BCP= BOILER CONTROL PANEL CP= CONTROL PANEL VSD= VARIABLE SPEED DRIVE FAP= FIRE ALARM PANEL CCP= CHILLER CONTROL PANEL (W/ EQUIPMENT INDICATED UNDERLINED)

ABBREVIATIONS

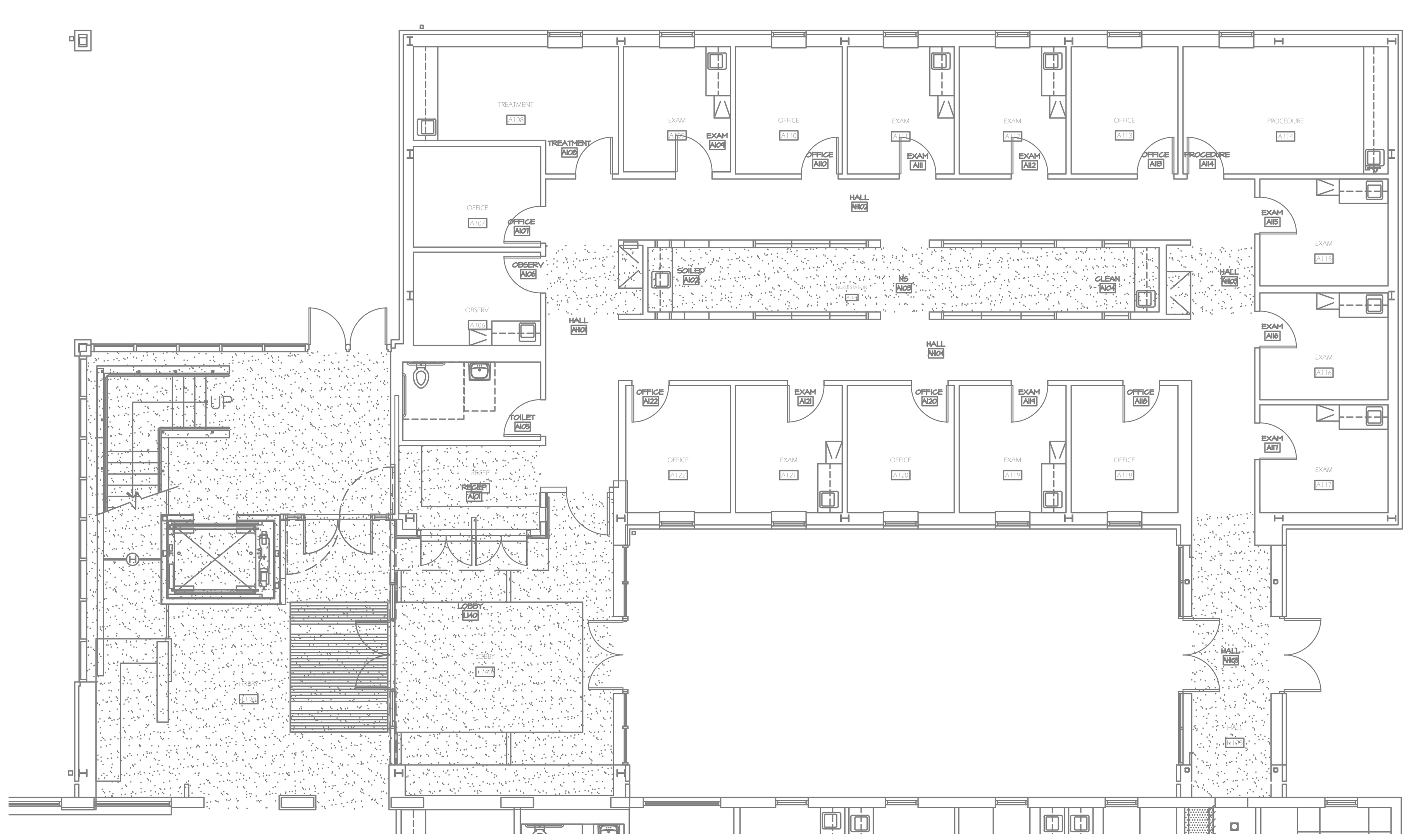
A	ACTUATOR
ACB	ACTIVE CHILLED BEAM
AD	AUTOMATIC DAMPER
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
BHP	BRAKE HORSEPOWER
C	COMMON
CBS	CHILLED BEAM SUPPLY
CBR	CHILLED BEAM RETURN
CC	COOLING COIL
CONC	CONCRETE
COND	CONDENSATE
CONT	CONTINUATION
DDC	DIRECT DIGITAL CONTROL
DN	DOWN
EA	EXHAUST AIR
EF	EXHAUST FAN
GYP BD	GYPSUM WALL BOARD
HC	HEATING COIL
HVAC	HEATING, VENTILATING, & AIR CONDITIONING
MAX	MAXIMUM
MBH	THOUSAND BTUs per HOUR
MCA	MINIMUM CIRCUIT AMPS
MFGR	MANUFACTURER
MIN	MINIMUM
MOCP	MAX. OVER CURRENT PROTECTION
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
PCB	PASSIVE CHILLED BEAM
REQ'D	REQUIRED
RP	RADIANT PANEL
S	SINK
SF	SUPPLY FAN
STL	STEEL
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
VFD	VARIABLE FREQUENCY DRIVE
WG	WATER GAUGE

GENERAL

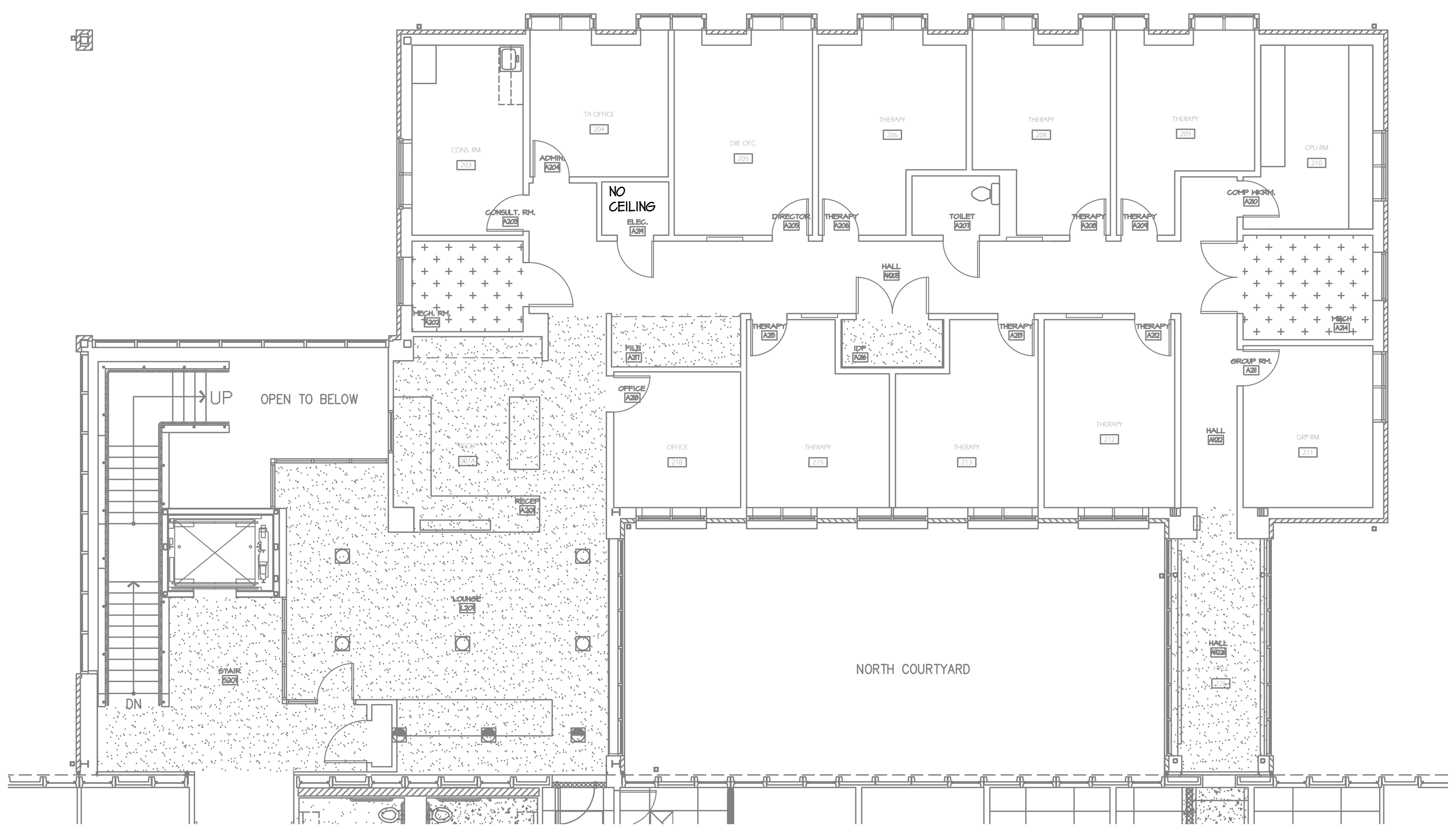
SYMBOL	ABBREVIATION	DESCRIPTION
(E)		EXISTING
		NEW TO EXISTING POINT OF CONNECTION
ø OR dia		DIAMETER
2		NOTE REFERENCE MARKER
2 M-100 / 2 M-501	PLAN OR DETAIL NUMBER / SHEET NUMBER	PLAN OR DETAIL REFERENCE MARKER
A M-401	SECTION LETTER / SHEET NUMBER	SECTION REFERENCE MARKER
EF 2	EQUIPMENT TYPE / EQUIPMENT NUMBER	EQUIPMENT MARKER
208		ROOM NUMBER
		EXISTING SHOWN LIGHT
		NEW WORK SHOWN BOLD
—x—x—x—		EXISTING TO BE REMOVED

GENERAL NOTES:

1. SIZE AND LOCATION OF ALL EXISTING PIPING AND OTHER MECHANICAL EQUIPMENT IS APPROXIMATE. CONTRACTOR SHALL SITE VERIFY THE EXACT LOCATION OF EXISTING AND CONSTRUCT ALL WORK FROM FIELD DIMENSIONS. CONTRACTOR SHALL MAKE ALL ADJUSTMENTS NECESSARY TO ACCOMMODATE MINOR DEVIATIONS AT NO COST TO OWNER.
2. FINE (LIGHT) LINE WORK INDICATES EXISTING PIPING AND OTHER MECHANICAL EQUIPMENT. BOLD (HEAVY) LINE WORK INDICATES NEW PIPING AND OTHER MECHANICAL EQUIPMENT.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE REMOVAL & RE-INSTALLATION OF CEILING SYSTEMS, CUTTING AND PATCHING TO ALLOW THE INSTALLATION OF MATERIALS AND EQUIPMENT AS SPECIFIED AND SHOWN ON DRAWINGS.
4. PROVIDE MANUAL AIR VENT AT ALL HIGH POINTS IN PIPING SYSTEMS.



FIRST FLOOR PLAN - CEILING TYPES 1 M-001
SCALE: 1/8" = 1'-0"
NORTH



SECOND FLOOR PLAN - CEILING TYPES 2 M-001
SCALE: 1/8" = 1'-0"
NORTH

CEILING TYPE LEGEND

CEILINGS ARE ACOUSTICAL LAY-IN TILE, EXCEPT WHERE SHOWN AS INDICATED BELOW.

HARD GYPSUM BOARD CEILING

METAL SOUND ABSORBING PANELS CEILING

SYSTEMS WEST ENGINEERS, INC.
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REGISTERED PROFESSIONAL ENGINEER 11,414 OREGON DEC. 3, 1981 STEVEN P. HOFFMAN EXPIRES 6-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

MECHANICAL LEGEND, GENERAL NOTES & CEILING TYPES

MARK	DATE	DESCRIPTION

DESIGNED	WKB
DRAWN	KMG
CHECKED	SPH
SCALE	N/A
DATE	13FEB2012
PROJECT	K010.06

M-001

SHT 9 OF 28

ACTIVE CHILLED BEAM SCHEDULE (ACB)

TAG No.	MANUFACTURER (1)(2) & MODEL No.	CEILING TYPE: HARD CEILING	CEILING TYPE: T-GRID	DIMENSIONS (NOMINAL): WIDTH IN.	DIMENSIONS (NOMINAL): LENGTH OF COIL FT.	DIMENSIONS (NOMINAL): TOTAL LENGTH FT.	DIMENSIONS (NOMINAL): HEIGHT IN.	COIL TYPE	PRIMARY AIR: INLET SIZE INCHES	PRIMARY AIR: INDUCTION NOZZLES (3): TYPE	PRIMARY AIR: INDUCTION NOZZLES (3): TOTAL	PRIMARY AIR: INDUCTION NOZZLES (3): ACTIVE	PRIMARY AIR: PD. INCHES (WG)	PRIMARY AIR: AIRFLOW CFM	EXHAUST: OUTLET SIZE INCHES	COOLING PERFORMANCE: COOLING BTU/HR MIN.	COOLING PERFORMANCE: EAT °F	COOLING PERFORMANCE: EWT °F	COOLING PERFORMANCE: LWT °F	COOLING PERFORMANCE: GPM	COOLING PERFORMANCE: P.D. FEET	RUN-OUT PIPE SIZE	HEATING PERFORMANCE: HEATING BTU/HR MIN.	HEATING PERFORMANCE: EAT °F	HEATING PERFORMANCE: EWT °F	HEATING PERFORMANCE: LWT °F	HEATING PERFORMANCE: GPM	HEATING PERFORMANCE: P.D. FEET	RUN-OUT PIPE SIZE	MAX. NC	REMARKS
ACB-1	TROX DID 302		X	12	4	4	9.5	4-PIPE	4	A	48	48	0.31	30	–	1,091	54	58	62.5	0.25	0.18	1/2	2,458	80	180	147.4	0.20	0.04	1/2	21	(1), (3), (5)
ACB-2	TROX DID 302	X	X	12	4	4	9.5	4-PIPE	4	A	48	48	0.21	25	–	1,182	54	58	59.4	1.10	2.66	1/2	3,119	80	180	150.4	0.20	0.04	1/2	16	(1), (3), (4), (5)
ACB-3	TROX DID 301	X		12	4	4	9.5	4-PIPE	4	B	48	48	0.46	30	–	919	54	58	62.2	0.25	0.11	1/2	2,705	80	180	176.8	0.20	0.03	1/2	26	(2), (3), (4), (5)
ACB-4	TROX DID 302	X		12	6	6	9.5	4-PIPE	4	A	64	64	0.34	40	–	1,653	54	58	61.8	0.50	0.86	1/2	4,544	80	180	137.2	0.20	0.06	1/2	18	(1), (3), (5)
ACB-5	TROX DID 302		X	12	8	8	9.5	4-PIPE	4	A	88	88	0.3	50	–	2,295	54	58	60.5	1.15	4.89	1/2	5,514	80	180	128.1	0.20	0.07	1/2	17	(1), (3), (5)
ACB-6	TROX DID 302		X	12	8	8	9.5	4-PIPE	4	A	88	88	0.44	60	–	2,554	54	58	61.3	0.90	3.14	1/2	6,045	80	180	123.5	0.20	0.07	1/2	22	(1), (3), (5)
ACB-7	TROX DID 302		X	12	8	8	9.5	4-PIPE	4	A	88	88	0.59	70	–	2,791	54	58	62.2	0.75	2.26	1/2	6,524	80	180	119.3	0.20	0.07	1/2	26	(1), (3), (5)
ACB-8	TROX DID 302		X	12	6	6	9.5	4-PIPE	4	A	64	64	0.52	50	–	2,087	54	58	61.0	0.80	2.02	1/2	5,112	80	180	132.1	0.20	0.06	1/2	24	(1), (3), (5)
ACB-9	TROX DID 302		X	12	8	8	9.5	4-PIPE	4	B	88	88	0.22	70	–	2,740	54	58	60.6	1.15	4.89	1/2	5,925	80	180	125.3	0.20	0.07	1/2	15	(1), (3), (5)
ACB-10	TROX DID 301		X	12	4	4	9.5	4-PIPE	4	A	48	48	0.31	15	–	574	54	58	60.1	0.25	0.11	1/2	2,025	80	180	178.4	0.20	0.03	1/2	21	(2), (3), (5)
ACB-11	TROX DID 302	X		12	10	10	9.5	4-PIPE	4	A	112	112	0.39	70	–	2,922	54	58	61.4	1.00	4.58	1/2	6,601	80	180	118.5	0.20	0.09	1/2	22	(1), (3), (5)
ACB-12	TROX DID 302	X		12	4	4	9.5	4-PIPE	4	A	48	48	0.42	35	–	1,496	54	58	59.4	1.25	3.36	1/2	3,632	80	180	146	0.20	0.04	1/2	26	(1), (3), (5)
ACB-13	TROX DID 302	X		12	4	4	9.5	4-PIPE	4	A	48	48	0.55	40	–	1,709	54	58	59.9	1.35	3.87	1/2	4,692	80	180	150.5	0.30	0.09	1/2	29	(1), (3), (5)

(1) BASIS OF DESIGN TROX DID 302 ACTIVE CHILLED BEAM.
(2) BASIS OF DESIGN TROX DID 301 ACTIVE CHILLED BEAM.
(3) SELECTION MADE FOR APPROXIMATELY 50-75 FPM AIR FLOW AT 5' - 6" ABOVE FINISH FLOOR.
(4) REFER TO 1/M-001 AN 2/M-001 FOR SPECIFIC CEILING TYPES, PROVIDE MOUNTING STYLE FOR HARD / PLASTER CEILINGS WHERE REQUIRED.
(5) CONTRACTOR & SUPPLIER TO VERIFY AIR & COIL CONNECTION CONFIGURATIONS (LEFT HAND/RIGHT HAND COIL CONNECTIONS) FOR EASE OF INSTALLATION FOR EACH ACTIVE CHILLED BEAM.

AIR HANDLING UNIT SCHEDULE (AHU)

		AHU-3
GENERAL	MANUFACTURER	McQUAY
	MODEL NUMBER	CAH007GDAM
	UNIT TYPE	INDOOR
	UNIT WEIGHT (LBS)	1,750
	MIN. EXT. STATIC PRESS. (IN W.C.)	1.50
	MIN. TOTAL STATIC PRESS. (IN W.C.)	2.80
	MINIMUM OSA FLOW RATE (CFM)	2,600
SUPPLY FAN	TYPE	CENTRIFUGAL
	AIRFLOW (CFM)	2600
	STATIC PRESSURE (IN W.C.) (1)	-
	RPM	1,750
	BLADE TYPE / CLASS	FC / 2
	WHEEL DIAMETER (INCHES)	9.5
	FAN HORSEPOWER (BHP)	2.8
	MOTOR HORSEPOWER	3
	VOLTAGE	208
	PHASE	3
	MOTOR CONTROL (2)	-
HEATING COIL	COIL AIRFLOW RATE (CFM)	2,600
	ENTERING AIR TEMP (°F)	17.0
	LEAVING AIR TEMP (°F)	80.4
	MAX AIRPRESSUREDROP (IN W.C.) (3)	0.44
	ENTERING WATER TEMP (°F)	180.0
	LEAVING WATER TEMP (°F)	159.9
	WATER FLOW RATE (GPM)	17.9
	MAX WATER PRESSURE DROP (FEET)	0.70
	MIN NUMBER OF ROWS	2
COOLING COIL	ENTERING DRY BULB TEMP (oF)	95.0
	ENTERING WET BULB TEMP (oF)	67.0
	LEAVING DRY BULB TEMP (oF)	52.0
	LEAVING WET BULB TEMP (°F)	50.6
	MAX AIRPRESSUREDROP (IN W.C.) (3)	0.52
	ENTERING WATER TEMP (°F)	45.0
	LEAVING WATER TEMP (°F)	58.8
	WATER FLOW RATE (GPM)	18.1
	MAX WATER PRESSURE DROP (FEET)	5.40
	MIN NUMBER OF ROWS	8
FINAL FILTER	FILTER TYPE	MERV 8
	FILTER THICKNESS (INCHES)	2.0
	MAXIMUM FACE VELOCITY (FPM)	365
	DESIGN PRESSURE DROP (IN W.C.)	1.00
COMMENTS		
(1)	PRESSURE SHOWN ARE BASIS OF DESIGN AND ARE FOR REFERENCE. UNIT SHALL MEET MINIMUM EXTERNAL STATIC PRESSURE.	
(2)	MOTOR CONTROLS FURNISHED BY DIV. 23.	
(3)	PRESSURE DROP AT RATED AIR HANDLER FLOW RATE.	

FAN COIL UNIT SCHEDULE (FCU)

TAG No.	MANUFACTURER & MODEL No.	CFM	MIN. OSA CFM	COOLING COIL: EAT DB °F	COOLING COIL: EAT WB °F	COOLING COIL: LAT DB °F	COOLING COIL: LAT WB °F	COOLING COIL: EWT °F	COOLING COIL: LWT °F	COOLING COIL: GPM	COOLING COIL: PD FEET	COOLING COIL: MIN. ROWS	HEATING CAPACITY: EAT °F	HEATING CAPACITY: LAT °F	HEATING CAPACITY: EWT °F	HEATING CAPACITY: LWT °F	HEATING CAPACITY: GPM	HEATING CAPACITY: PD FEET	HEATING CAPACITY: MIN. ROWS	ELECTRICAL: HP (1)	ELECTRICAL: VOLTS	ELECTRICAL: PH	REMARKS
FC-1	NAILOR 38MUZW SIZE 6	400	150	80.0	64.0	54.0	53.4	45	59.1	1.8	2.5	4	50.0	95.0	180	134	0.9	0.9	1	1/8	120	1	

PUMP SCHEDULE (P)

TAG No.	MANUFACTURER & MODEL No.	SERVICE	TYPE	FLOW (GPM)	TOTAL HEAD (FT)	MIN EFF (%)	BHP	NPSH (FT)	MOTOR: VOLTS	MOTOR: PHASE	MOTOR: RPM	MOTOR: HP	MOTOR CONTROL (1): STARTER	MOTOR CONTROL (1): VFD	REMARKS
CHWP-3	B&G SERIES 80, 1½ x 1½ x 9½	CHILLED WTR	IN-LINE	51	55	50	1.42	5.3	208	3	1750	2.00		X	
HWP-7	B&G SERIES 80, 1½ x 1½ x 9½	HTG WTR	IN-LINE	45	55	49	1.28	5	208	3	1750	2.00	X		
HWP-8	B&G SERIES 80, 1½ x 1½ x 9½	HTG WTR	IN-LINE	45	55	49	1.28	5	208	3	1750	2.00	X		
CBP-1	B&G SERIES 60, 1¼ x 1¼ x 6¼	RAD. CHILL WTR	IN-LINE	55	25	63	0.56	9.1	208	3	1750	¾		X	

(1) MOTOR CONTROL FURNISHED BY DIV. 23

PASSIVE CHILLED BEAM SCHEDULE (PCB)

TAG No.	MANUFACTURER (1)(2) & MODEL No.	DIMENSIONS (NOMINAL): WIDTH IN.	DIMENSIONS (NOMINAL): LENGTH OF COIL FT.	DIMENSIONS (NOMINAL): TOTAL LENGTH FT.	DIMENSIONS (NOMINAL): HEIGHT IN.	COIL TYPE	COOLING PERFORMANCE: COOLING BTU/HR MIN.	COOLING PERFORMANCE: EAT °F	COOLING PERFORMANCE: EWT °F	COOLING PERFORMANCE: LWT °F	COOLING PERFORMANCE: GPM	COOLING PERFORMANCE: P.D. FEET	RUN-OUT PIPE SIZE	REMARKS
PCB-1	TROX TCB-EB	24	8	8	10.0	2-PIPE	2,280	74	58	64.0	0.78	1.50	1/2	(1)

(1) SELECTION MADE FOR APPROXIMATELY 50 FPM AIR FLOW AT 3' - 0" BELOW FACE OF PASSIVE CHILLED BEAM.

SYSTEMS WEST ENGINEERS, INC.
mechanical electrical
411 HIGH STREET
EUGENE, OREGON 97401-2427
phone: 541.342.7210
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www.systemswestengineers.com

REGISTERED PROFESSIONAL ENGINEER 11,414 OREGON DEC. 3, 1981 STEVEN P. HOFFMAN EXPIRES: 6-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

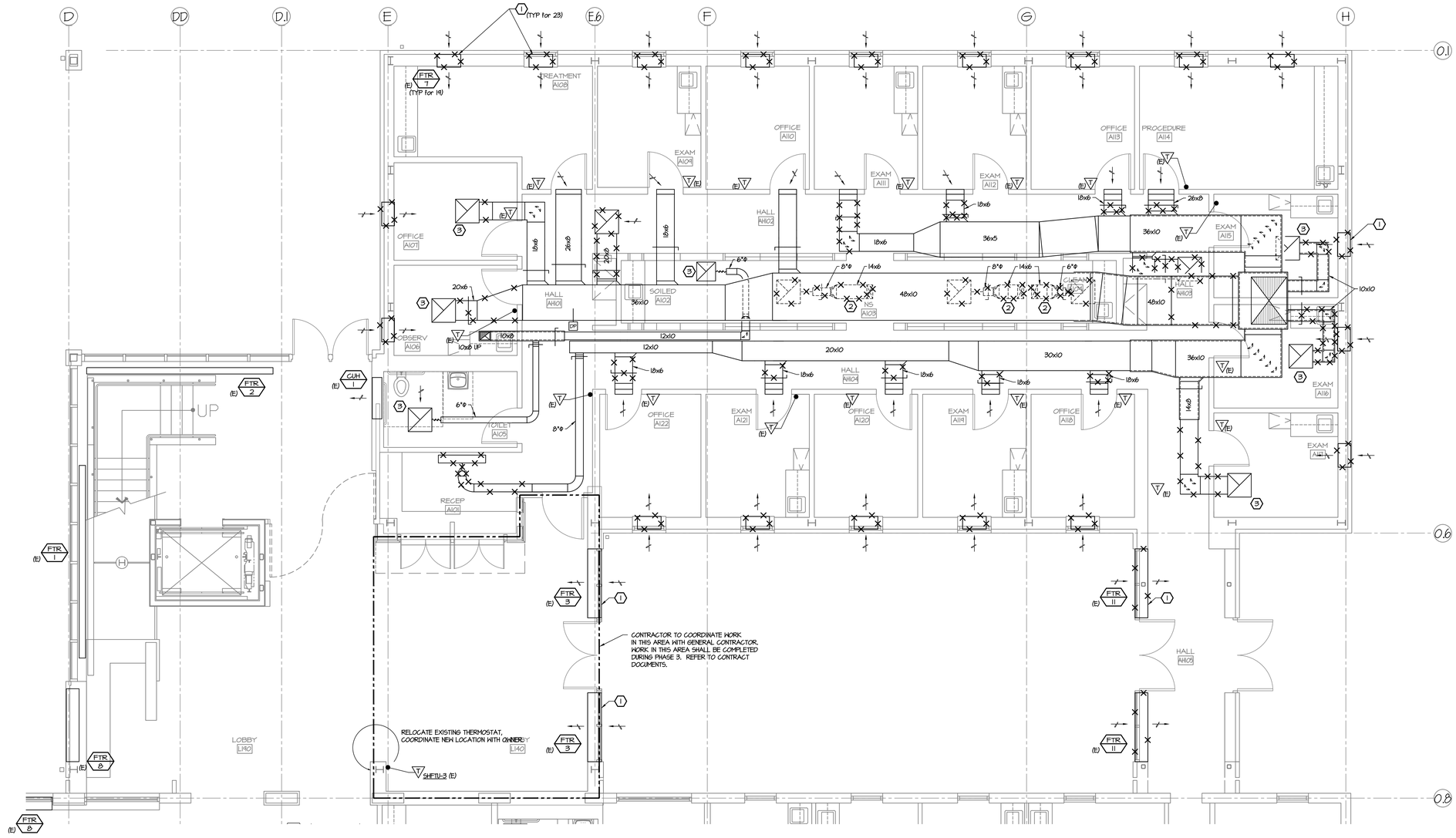
OWNER:
UNIVERSITY of OREGON

SCHEDULES

MARK DATE DESCRIPTION

DESIGNED MKB
DRAWN KMG
CHECKED SPH
SCALE NTS
DATE 13FEB2012
PROJECT K010.06

M-002
SHT 10 OF 28



FIRST FLOOR NORTHEAST WING AIR DISTRIBUTION DEMOLITION PLAN

1 / M-101

SCALE: 1/4" = 1'-0"

NORTH

REFERENCE NOTES:

1. REMOVE EXISTING DAMPER ACTUATOR & RELATED CONTROL WIRING. REFER TO ARCHITECTURAL DRAWING, DETAIL 12/A-701 FOR RELATED WORK.
2. REMOVE EXISTING EXHAUST GRILLES, FLEX & SHEETMETAL DUCTWORK FOR THESE 3 LOCATIONS. CAP DUCT TAKEOFFS AT MAIN DUCT.
3. REMOVE, CLEAN & SAVE THE EXHAUST GRILLES SHOWN & REINSTALL INTO NEW LOCATIONS AS SHOWN ON DRAWING I/M-122.

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REGISTERED PROFESSIONAL ENGINEER 11,414 OREGON DEC. 31, 1981 STEVEN P. HOFFMAN EXPIRES: 6-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

FIRST FLOOR NORTHEAST WING AIR DISTRIBUTION DEMOLITION PLAN

MARK	DATE	DESCRIPTION

DESIGNED	WKB
DRAWN	WKB
CHECKED	SPH
SCALE	AS SHOWN
DATE	13FEB2012
PROJECT	K010.06

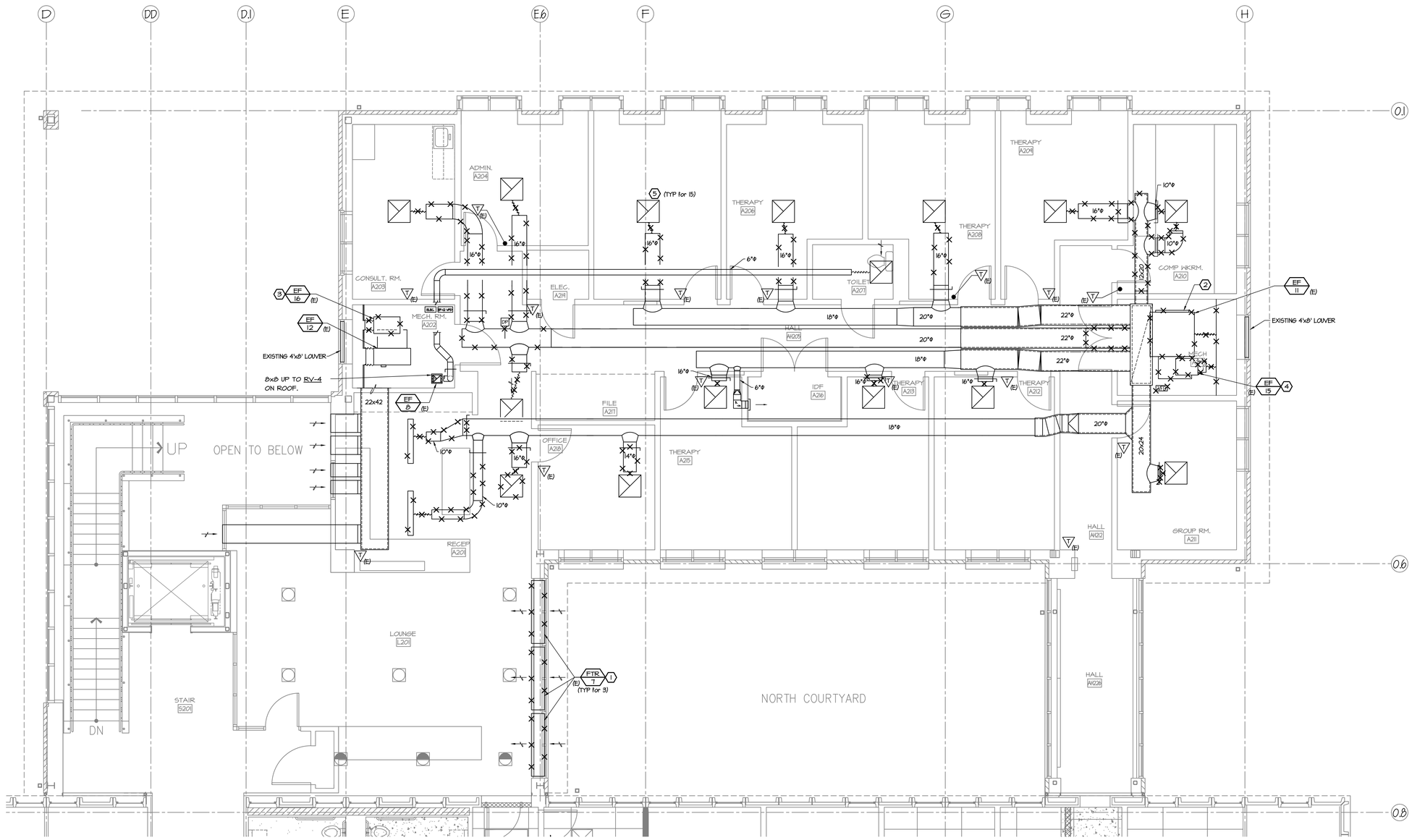
M-101

SHT 11 OF 28

KEY PLAN
NOT TO SCALE

REFERENCE NOTES:

1. REMOVE EXISTING DAMPER ACTUATOR & RELATED CONTROL WIRING. REFER TO ARCHITECTURAL DRAWING, DETAIL 12/A-101 FOR RELATED WORK.
2. REMOVE EXISTING EF-11, EF-11 MOUNTING FRAME & EF-11 VFD.
3. REMOVE EXISTING EXHAUST FAN EF-16 & ASSOCIATED MOUNTING BRACKETS, ELECTRICAL & DDC CONTROL COMPONENTS. CAP EXISTING DUCT AT PLENUM WALL BETWEEN EXHAUST AIR PLENUM AND MECHANICAL ROOM. SEE 1/M411 FOR NEW WORK.
4. REMOVE EXISTING EXHAUST FAN EF-15 & ASSOCIATED MOUNTING BRACKETS, ELECTRICAL DISCONNECT, & DDC CONTROL COMPONENTS.
5. REMOVE, CLEAN & SAVE THE EXHAUST GRILLES SHOWN & REINSTALL INTO NEW LOCATIONS AS SHOWN ON DRAWINGS 1/M-122.



SECOND FLOOR NORTHEAST WING AIR DISTRIBUTION DEMOLITION PLAN — 1 / M-102

SCALE: 1/4" = 1'-0"

NORTH

KEY PLAN
NOT TO SCALE

SYSTEMS WEST ENGINEERS, INC.
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REGISTERED PROFESSIONAL ENGINEER 11,414 OREGON DEC. 3, 1980 STEVEN P. HOFFMAN EXPIRES 6-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

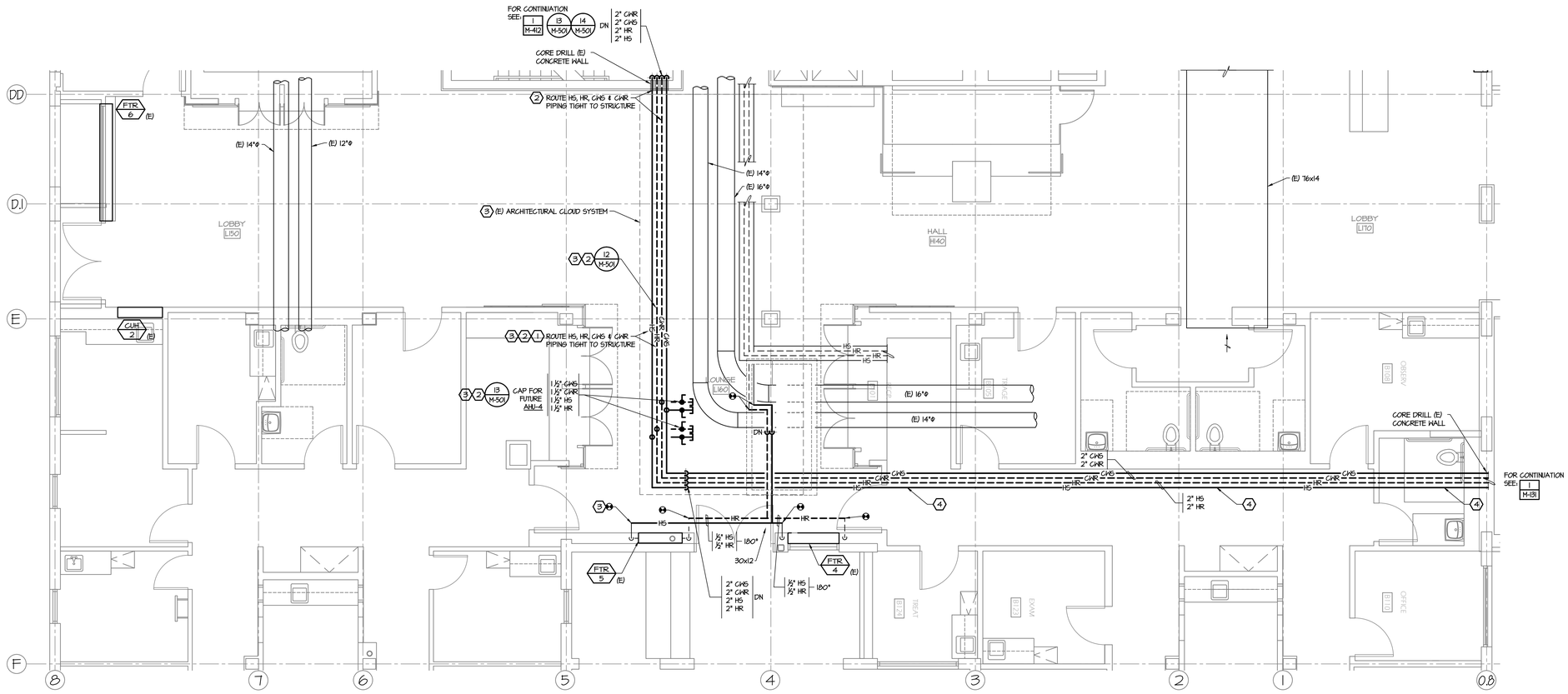
SECOND FLOOR NORTHEAST WING AIR DISTRIBUTION DEMOLITION PLAN

MARK	DATE	DESCRIPTION

DESIGNED	WKB
DRAWN	WKB
CHECKED	SPH
SCALE	AS SHOWN
DATE	13FEB2012
PROJECT	K010.06

M-102

SHT 12 OF 28



REFERENCE NOTES:

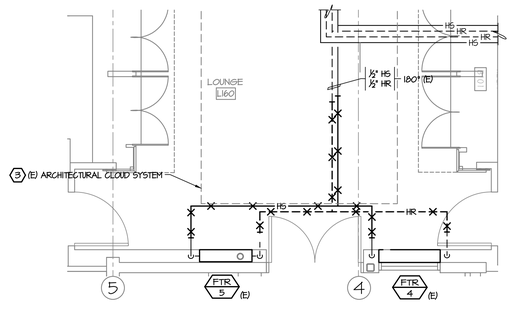
1. INSTALL PIPING ABOVE EXISTING ARCHITECTURAL CLOUD SYSTEM. ROUTE TIGHT TO STRUCTURE TO MAINTAIN CLEARANCES FOR FUTURE WORK.
2. PAINT ALL NEW CWS, CWR, HS & HR PIPING, HANGERS AND INSULATION FLAT BLACK TO MATCH EXISTING.
3. ROUTE CWS, CWR, HS & HR PIPING AS CLOSE TO STRUCTURE AS POSSIBLE TO MAINTAIN CLEARANCES FOR FUTURE WORK.
4. ROUTE CWS, CWR, HS & HR PIPING IN THIS CORRIDOR ABOVE EXISTING ACOUSTICAL TILE CEILING. COORDINATE WORK IN THIS AREA WITH OWNER TO ARRANGE CONTRACTORS WORK SCHEDULE WITH UNIVERSITY STAFF WORKING IN THIS AREA.

FIRST FLOOR MAIN LOBBY HYDRONIC PIPING PLAN

1 / M-121

SCALE: 1/4" = 1'-0"

NORTH



PARTIAL FIRST FLOOR HYDRONIC DEMOLITION PLAN

2 / M-121

SCALE: 1/4" = 1'-0"

NORTH

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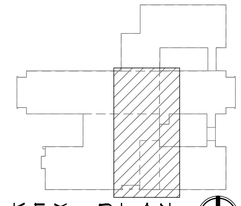
REGISTERED PROFESSIONAL ENGINEER 11,414 OREGON DEC. 3, 1981 STEVEN P. HOFFMAN EXPIRES: 6-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON



KEY PLAN
NOT TO SCALE

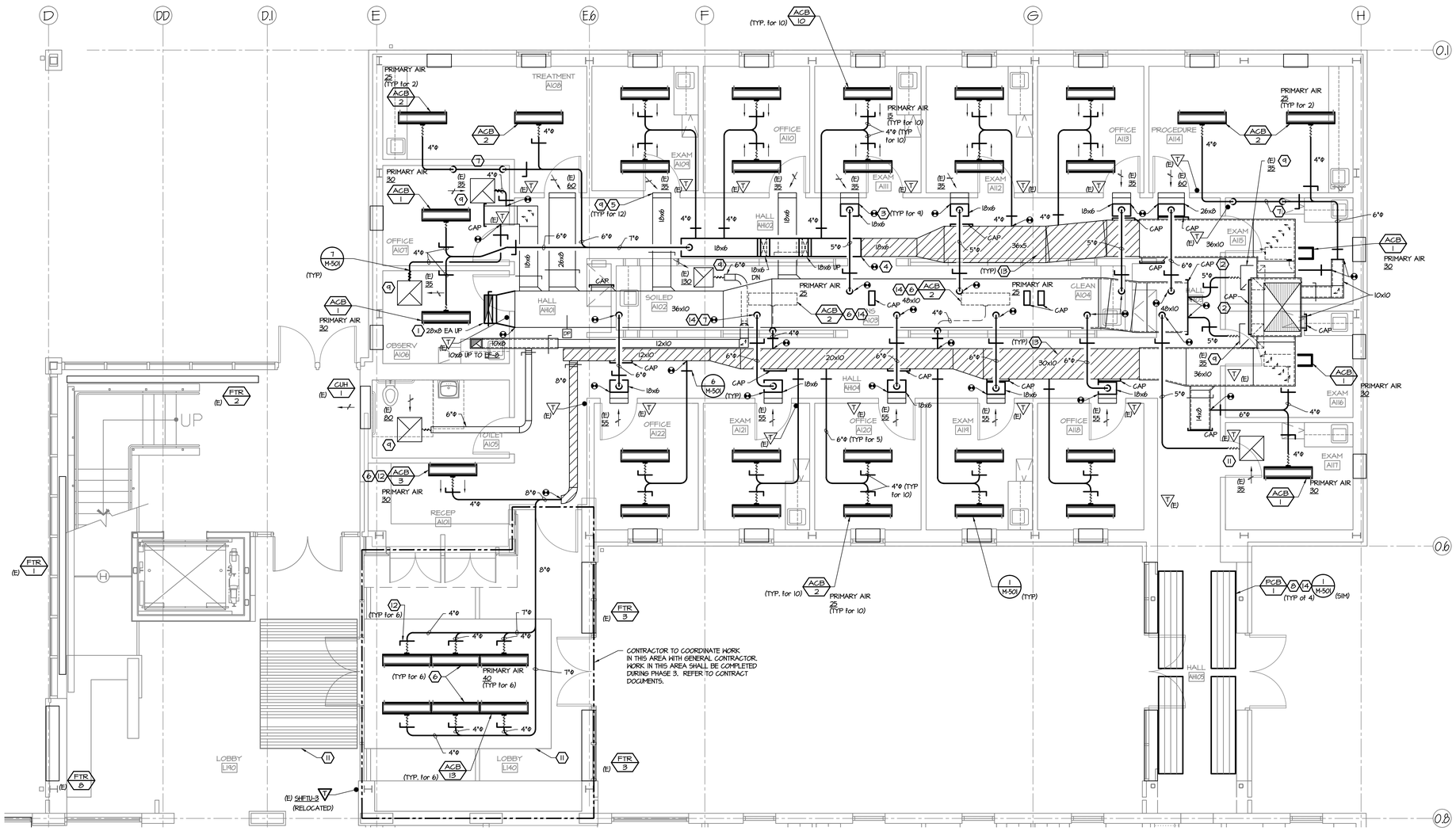
FIRST FLOOR MAIN LOBBY HYDRONIC & ROOF AIR DISTRIBUTION PARTIAL PLANS

MARK	DATE	DESCRIPTION

DESIGNED MKB
DRAWN MKB
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

M-121

SHT 13 OF 28



FIRST FLOOR NORTHEAST WING AIR DISTRIBUTION PLAN

SCALE: 1/4" = 1'-0"

1 / M-122

REFERENCE NOTES:

1. INSTALL NEW EXHAUST AIR DUCT RISER UP THRU SECOND FLOOR. PROVIDE ANGLE IRON FRAME AROUND PERIMETER OF DUCT OPENING WITH EXPANDED METAL SCREEN ON DUCT OPENING AT FLOOR AS DUCT PENETRATES EXISTING SOUNDPROOFING IN FLOOR OF MECH. ROOM 202. SEAL DUCT PENETRATION THRU FLOOR. PROVIDE MANUAL DAMPER IN DUCT RISER.
2. CAP EXISTING EXHAUST AIR DUCT & PLENUM AS SHOWN.
3. CONNECT EXISTING DUCT SERVING EXISTING SIDEWALL EXHAUST GRILLES TO NEW EXHAUST AIR DUCT AS SHOWN. TYPICAL FOR 9 LOCATIONS.
4. NOT USED.
5. EXISTING SIDEWALL EXHAUST GRILLES TO REMAIN. BALANCE AIR FLOWS TO NEW VALUES SHOWN.
6. INSTALL ACTIVE CHILLED BEAMS INTO NEW HARD CEILING. PROVIDE HARD CEILING/PLASTER RING-STYLE BORDER.
7. ROUTE ROUND SUPPLY AIR DUCTS ABOVE CEILING UNDER EXISTING BEAMS IN THESE AREAS.
8. INSTALL PASSIVE CHILLED BEAMS (PCB) BELOW EXISTING EXPOSED FIRE SPRINKLER & DOMESTIC WATER PIPING. RELOCATE EXISTING SPRINKLER HEADS BELOW & IN BETWEEN RADIANT PANELS. INSTALL PCB'S WITH EQUAL SPACING AROUND EXISTING EXIT SIGN.
9. REINSTALL CLEANED EXISTING EXHAUST GRILLES REMOVED DURING DEMOLITION PHASE INTO NEW LOCATIONS SHOWN.
10. NOT USED.
11. REMOVAL & REPLACEMENT OF (E) ARCHITECTURAL CLOUD, EXISTING CEILING REMOVAL, CEILING REPAIR AND NEW CEILING SOFFITS PROVIDED BY GENERAL CONTRACTOR. CONTRACTOR TO COORDINATE WORK IN THIS AREA WITH GENERAL CONTRACTOR.
12. PROVIDE CABLE TYPE CONCEALED DAMPER OPERATORS IN THIS AREA.
13. PROVIDE EXTERNAL DUCT INSULATION WRAP ON EXISTING UNINSULATED & UNLINED SUPPLY AIR DUCTWORK WHERE SHOWN.
14. MOUNT PASSIVE CHILLED BEAMS (PCB) SUSPENDED FROM EXISTING CEILING, MAINTAIN A MINIMUM 8" OF CLEARANCE BELOW FINISHED CEILING & TOP OF PASSIVE CHILLED BEAM ENCLOSURE. INSTALL PER MANUFACTURERS MOUNTING & INSTALLATION RECOMMENDATIONS.

SHEET NOTES:

1. MODIFY EXISTING SUSPENDED ACOUSTICAL CEILING SYSTEM FOR INSTALLATION OF NEW ACTIVE CHILLED BEAMS. SUPPLY & INSTALL PER MANUFACTURERS RECOMMENDATIONS ALL NECESSARY GIRD RUNNERS, CROSS RUNNERS, CROSS TEE'S, GRID SUPPORT WIRE & ACCESSORIES NEEDED TO INTEGRATE ACTIVE CHILLED BEAMS INTO EXISTING CEILING SYSTEM. MATCH EXISTING GRID COLOR & SIZE. TRIM EXISTING ACOUSTICAL TILES AS NEED TO FIT NEW LAYOUT; PROVIDE NEW ACOUSTICAL CEILING TILES WHERE NECESSARY TO INSTALL ACTIVE CHILLED BEAMS, GRILLES & DIFFUSERS.
2. CONTRACTOR TO FIELD VERIFY AIR & COIL CONNECTION HANDINGS FOR EASE OF INSTALLATION FOR EACH ACTIVE CHILLED BEAM. COORDINATE AIR & COIL CONNECTIONS FOR EACH ACTIVE CHILLED BEAM WITH DUCTWORK & HYDRONIC PIPING LAYOUTS SHOWN ON DRAWINGS.
3. MECHANICAL CONTRACTOR TO COORDINATE MOVEMENT OF ANY EXISTING ELECTRICAL CONDUIT WITH ELECTRICAL CONTRACTOR TO FACILITATE INSTALLATION OF NEW ACTIVE CHILLED BEAMS.
4. COORDINATE INSTALLATION OF ACTIVE CHILLED BEAMS & DUCTWORK CHANGES WITH NEW HYDRONIC PIPING.
5. CONTRACTOR SHOULD BE AWARE OF EXISTING RADIANT TUBING LOCATED IN FIRST AND SECOND FLOOR SLABS. COORDINATE MECHANICAL EQUIPMENT HANGING FASTENINGS AND ANCHORS ACCORDINGLY.

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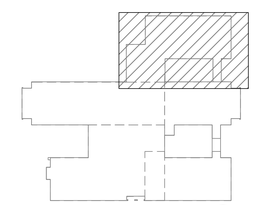


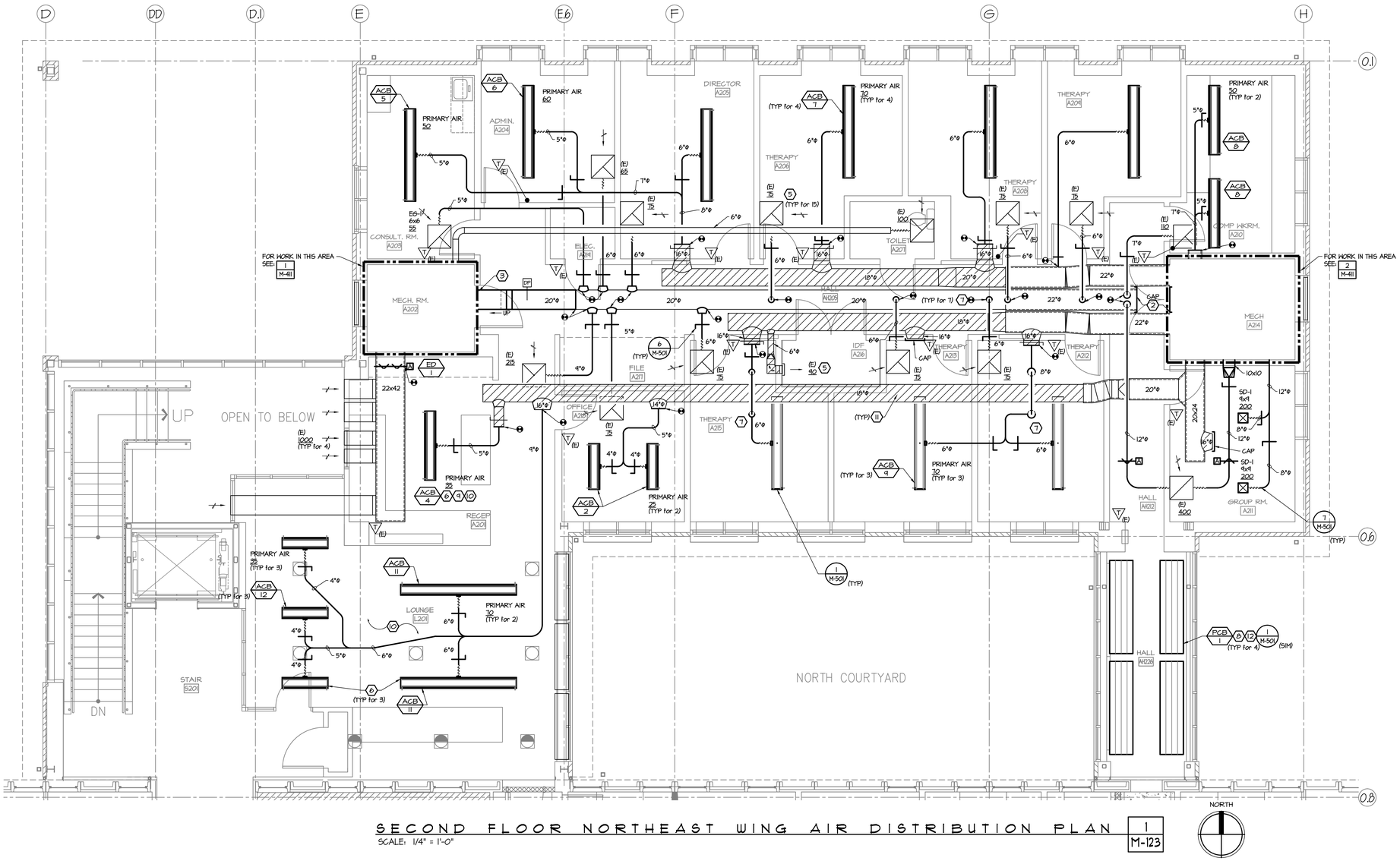
KEY PLAN
NOT TO SCALE

FIRST FLOOR NORTHEAST WING AIR DISTRIBUTION PLAN

MARK	DATE	DESCRIPTION

DESIGNED WKB
DRAWN WKB
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

M-122
SHT 14 OF 28



SECOND FLOOR NORTHEAST WING AIR DISTRIBUTION PLAN

SCALE: 1/4" = 1'-0"

1 / M-123

REFERENCE NOTES:

1. INSTALL NEW EXHAUST AIR DUCT DROP DOWN THRU SECOND FLOOR. PROVIDE ANGLE IRON FRAME AROUND PERIMETER OF DUCT OPENING WITH EXPANDED METAL SCREEN ON DUCT OPENING AT FLOOR AS DUCT PENETRATES EXISTING SOUNDPROOFING IN FLOOR OF MECH. ROOM 202.
2. CAP EXISTING EXHAUST AIR DUCT & PLENUM OPENING AS SHOWN.
3. EXTEND EXISTING EXHAUST DUCT INTO MECH. ROOM 202. SEAL WALL & PLENUM PENETRATIONS REQUIRED FOR THIS DUCT EXTENSION.
4. NOT USED.
5. EXISTING GRILLES TO REMAIN. BALANCE AIR FLOWS TO NEW VALUES SHOWN.
6. INSTALL ACTIVE CHILLED BEAM INTO EXISTING HARD CEILING. PROVIDE WITH HARD CEILING/PLASTER RING-STYLE BORDER.
7. ROUTE ROUND SUPPLY AIR DUCTS ABOVE EXISTING DUCTWORK & THRU EXISTING TRUSSES IN THESE AREAS.
8. INSTALL PASSIVE CHILLED BEAMS (PCB) BELOW EXISTING EXPOSED FIRE SPRINKLER PIPING. RELOCATE EXISTING SPRINKLER HEADS BELOW & IN BETWEEN PASSIVE CHILLED BEAMS.
9. NOT USED.
10. PROVIDE CABLE TYPE CONCEALED DAMPER OPERATORS IN THIS AREA.
11. PROVIDE EXTERNAL DUCT INSULATION WRAP ON EXISTING UNINSULATED & UNLINED SUPPLY AIR DUCTWORK WHERE SHOWN.
12. MOUNT PASSIVE CHILLED BEAMS (PCB) SUSPENDED FROM EXISTING CEILING, MAINTAIN A MINIMUM 8" OF CLEARANCE BELOW FINISHED CEILING & TOP OF PASSIVE CHILLED BEAM ENCLOSURE. INSTALL PER MANUFACTURERS MOUNTING & INSTALLATION RECOMMENDATIONS.

SHEET NOTES:

1. MODIFY EXISTING SUSPENDED ACOUSTICAL CEILING SYSTEM FOR INSTALLATION OF NEW ACTIVE CHILLED BEAMS. SUPPLY & INSTALL PER MANUFACTURERS RECOMMENDATIONS ALL NECESSARY GRID RUNNERS, CROSS RUNNERS, CROSS TEE'S, GRID SUPPORT WIRE & ACCESSORIES NEEDED TO INTEGRATE ACTIVE CHILLED BEAMS INTO EXISTING CEILING SYSTEM. MATCH EXISTING GRID COLOR & SIZE. TRIM EXISTING ACOUSTICAL TILES AS NEED TO FIT NEW LAYOUT. PROVIDE NEW ACOUSTICAL CEILING TILES WHERE NECESSARY TO INSTALL ACTIVE CHILLED BEAMS, GRILLES & DIFFUSERS.
2. CONTRACTOR TO FIELD VERIFY AIR & COIL CONNECTION HANDINGS FOR EASE OF INSTALLATION FOR EACH ACTIVE CHILLED BEAM. COORDINATE AIR & COIL CONNECTIONS FOR EACH ACTIVE CHILLED BEAM WITH DUCTWORK & HYDRONIC PIPING LAYOUTS SHOWN ON DRAWINGS.
3. MECHANICAL CONTRACTOR TO COORDINATE MOVEMENT OF ANY EXISTING ELECTRICAL CONDUIT WITH ELECTRICAL CONTRACTOR TO FACILITATE INSTALLATION OF NEW ACTIVE CHILLED BEAMS. INSTALL ACTIVE CHILLED BEAMS INTO EXISTING ACOUSTICAL CEILING SYSTEM & IN BETWEEN EXISTING ROOF STRUCTURE.
4. COORDINATE INSTALLATION OF ACTIVE CHILLED BEAMS & DUCTWORK CHANGES WITH NEW HYDRONIC PIPING.
5. CONTRACTOR SHOULD BE AWARE OF EXISTING RADIANT TUBING LOCATED IN FIRST AND SECOND FLOOR SLABS. COORDINATE MECHANICAL EQUIPMENT HANGING FASTENINGS AND ANCHORS ACCORDINGLY.

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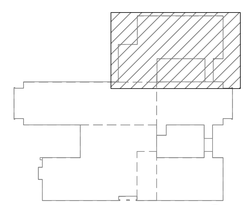
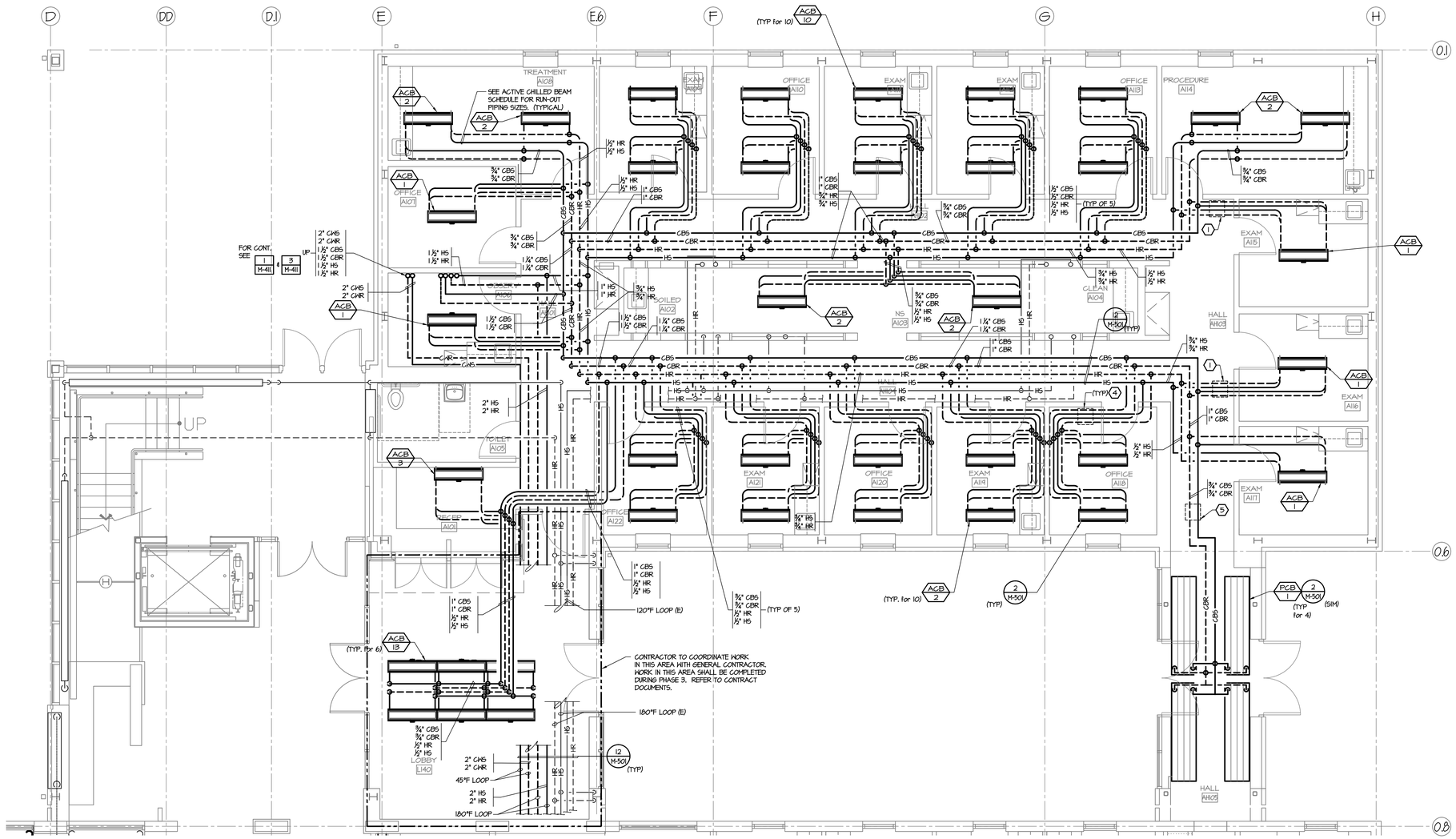


KEY PLAN
NOT TO SCALE

MARK	DATE	DESCRIPTION

DESIGNED WKB
DRAWN WKB
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

M-123
SHT 15 OF 28



FIRST FLOOR PLAN - HYDRONIC PIPING 1 M-131 <2> <3>

SCALE: 1/4" = 1'-0"

REFERENCE NOTES:

1. LOCATE ACTIVE CHILLED BEAM CONSOLIDATED SUPPLY & RETURN FITTINGS, CONTROL VALVES, SHUT-OFF VALVES ABOVE CEILINGS IN HALLWAYS, NOT ABOVE CEILING INSIDE EXAM ROOMS & OFFICES. MAINTAIN ACCESSIBILITY & RECOMMENDED CLEARANCES FOR SERVICE & MAINTENANCE. LOCATIONS ARE SUGGESTED. FIELD VERIFY EXACT LOCATIONS WITH OWNER & ENGINEER.
2. CHILLED WATER, HEATING WATER SUPPLY, RETURN PIPING MAINS & RISERS TO BE COPPER. INDIVIDUAL RUN-OUTS FROM MAINS TO ACTIVE CHILLED BEAMS TO BE PEX-AL-PEX.
3. COORDINATE ACTIVE CHILLED WATER & HOT WATER PIPING CONNECTION CONFIGURATIONS (LEFT-HAND, RIGHT-HAND, SAME SIDE AS AIR INLET, OPPOSITE AIR INLET, ETC) WITH ACTIVE CHILLED BEAM SUPPLIER.
4. VALVE & INSTRUMENTATION ASSEMBLY - SEE 2/M-501 (TYP). INSTALL AS CLOSE TO DOOR AS POSSIBLE.
5. VALVE & INSTRUMENTATION ASSEMBLY FOR PASSIVE CHILLED BEAMS, LOCATE ABOVE CORRIDOR ON BOTH FLOORS

SHEET NOTES:

1. MODIFY EXISTING SUSPENDED ACOUSTICAL CEILING SYSTEM FOR INSTALLATION OF NEW ACTIVE CHILLED BEAMS. SUPPLY & INSTALL PER MANUFACTURERS RECOMMENDATIONS ALL NECESSARY GRID RUNNERS, CROSS RUNNERS, CROSS TEE'S, GRID SUPPORT WIRE & ACCESSORIES NEEDED TO INTEGRATE ACTIVE CHILLED BEAMS INTO EXISTING CEILING SYSTEM. MATCH EXISTING GRID COLOR & SIZE. TRIM EXISTING ACOUSTICAL TILES AS NEED TO FIT NEW LAYOUT; PROVIDE NEW ACOUSTICAL CEILING TILES WHERE NECESSARY TO INSTALL ACTIVE CHILLED BEAMS, GRILLES & DIFFUSERS. REPLACE EXISTING ACOUSTICAL CEILING TILES IN PROJECT AREA DAMAGED AS A RESULT OF THE WORK.
2. CONTRACTOR TO VERIFY AIR & COIL CONNECTION HANDINGS FOR EASE OF INSTALLATION FOR EACH ACTIVE CHILLED BEAM. COORDINATE AIR & COIL CONNECTIONS FOR EACH ACTIVE CHILLED BEAM WITH DUCTWORK & HYDRONIC PIPING LAYOUTS SHOWN ON DRAWINGS.
3. MECHANICAL CONTRACTOR TO COORDINATE MOVEMENT OF ANY EXISTING ELECTRICAL CONDUIT WITH ELECTRICAL CONTRACTOR TO FACILITATE INSTALLATION ON NEW ACTIVE CHILLED BEAMS.
4. COORDINATE INSTALLATION OF ACTIVE CHILLED BEAMS & DUCTWORK CHANGES WITH NEW HYDRONIC PIPING.
5. CONTRACTOR SHOULD BE AWARE OF EXISTING RADIANT TUBING LOCATED IN FIRST AND SECOND FLOOR SLABS. COORDINATE MECHANICAL EQUIPMENT HANGING FASTENINGS AND ANCHORS ACCORDINGLY.

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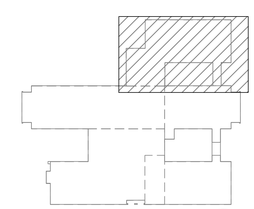


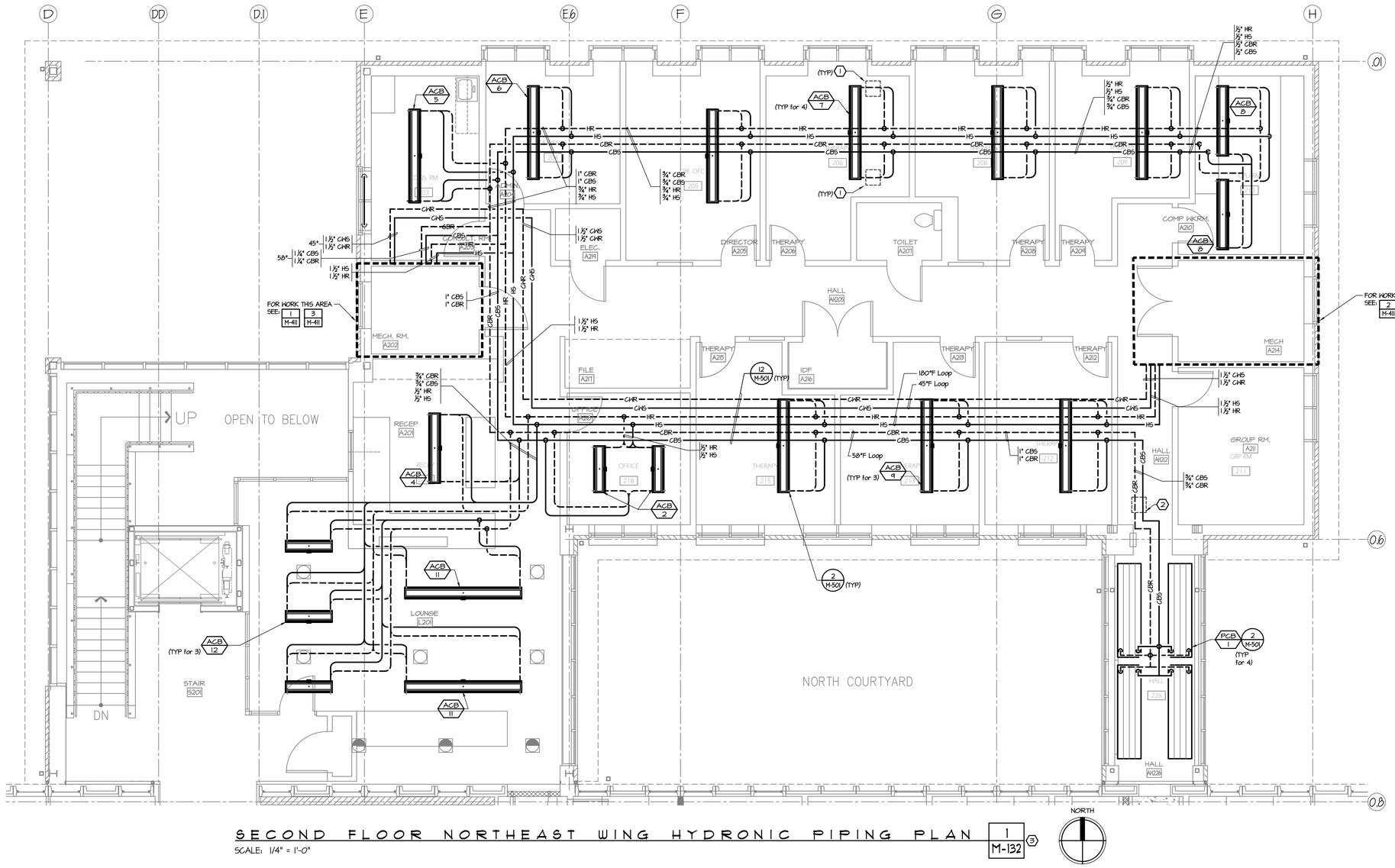
KEY PLAN
NOT TO SCALE

FIRST FLOOR NORTHEAST WING HYDRONIC PIPING PLAN

MARK	DATE	DESCRIPTION

DESIGNED MAW
DRAWN MAW
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

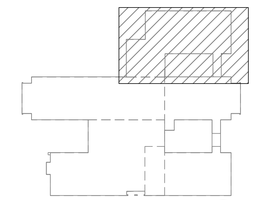
M-131
SHT 16 OF 28



SECOND FLOOR NORTHEAST WING HYDRONIC PIPING PLAN

SCALE: 1/4" = 1'-0"

NORTH



KEY PLAN
NOT TO SCALE

REFERENCE NOTES:

1. VALVE & INSTRUMENTATION ASSEMBLY - SEE 2/M-501 (TYP). COORDINATE THE LOCATION OF THE VALVE & INSTRUMENTATION ASSEMBLY WITH THE OWNER TO FACILITATE MAINTENANCE
2. VALVE & INSTRUMENTATION ASSEMBLY FOR PASSIVE CHILLED BEAMS, LOCATE ABOVE CORRIDOR ON BOTH FLOORS
3. COORDINATE ACTIVE CHILLED CHILLED WATER & HOT WATER PIPING CONNECTION CONFIGURATIONS (LEFT-HAND, RIGHT-HAND, SAME SIDE AS AIR INLET, OPPOSITE AIR INLET, ETC) WITH ACTIVE CHILLED BEAM SUPPLIER

SHEET NOTES:

1. MODIFY EXISTING SUSPENDED ACOUSTICAL CEILING SYSTEM FOR INSTALLATION OF NEW ACTIVE CHILLED BEAMS. SUPPLY & INSTALL PER MANUFACTURERS RECOMMENDATIONS ALL NECESSARY GRID RUNNERS, CROSS RUNNERS, CROSS TEE'S, GRID SUPPORT WIRE & ACCESSORIES NEEDED TO INTEGRATE ACTIVE CHILLED BEAMS INTO EXISTING CEILING SYSTEM. MATCH EXISTING GRID COLOR & SIZE. TRIM EXISTING ACOUSTICAL TILES AS NEED TO FIT NEW LAYOUT. PROVIDE NEW ACOUSTICAL CEILING TILES WHERE NECESSARY TO INSTALL ACTIVE CHILLED BEAMS, GRILLES & DIFFUSERS.
2. CONTRACTOR TO VERIFY AIR & COIL CONNECTION HANDINGS FOR EASE OF INSTALLATION FOR EACH ACTIVE CHILLED BEAM. COORDINATE AIR & COIL CONNECTIONS FOR EACH ACTIVE CHILLED BEAM WITH DUCTWORK & HYDRONIC PIPING LAYOUTS SHOWN ON DRAWINGS.
3. MECHANICAL CONTRACTOR TO COORDINATE MOVEMENT OF ANY EXISTING ELECTRICAL CONDUIT WITH ELECTRICAL CONTRACTOR TO FACILITATE INSTALLATION OF NEW ACTIVE CHILLED BEAMS. INSTALL ACTIVE CHILLED BEAMS INTO EXISTING ACOUSTICAL CEILING SYSTEM & IN BETWEEN EXISTING ROOF STRUCTURE.
4. COORDINATE INSTALLATION OF ACTIVE CHILLED BEAMS & DUCTWORK CHANGES WITH NEW HYDRONIC PIPING.
5. CONTRACTOR SHOULD BE AWARE OF EXISTING RADIANT TUBING LOCATED IN FIRST AND SECOND FLOOR SLABS. COORDINATE MECHANICAL EQUIPMENT HANGING FASTENINGS AND ANCHORS ACCORDINGLY.

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EXPIRES: 6-30-13

HVAC SYSTEM REPLACEMENT

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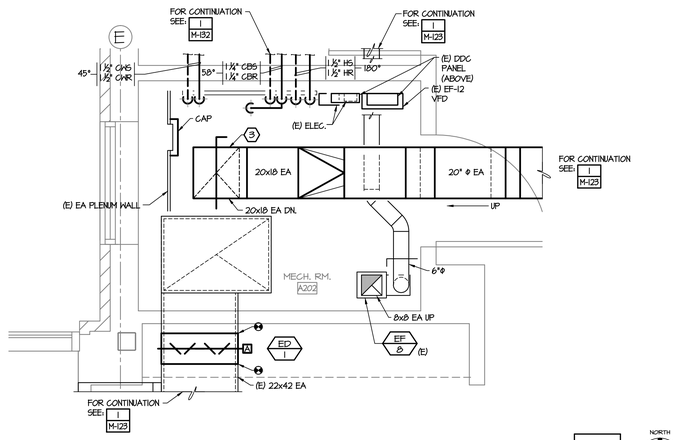
SECOND FLOOR NORTHEAST WING HYDRONIC PIPING PLAN

MARK	DATE	DESCRIPTION

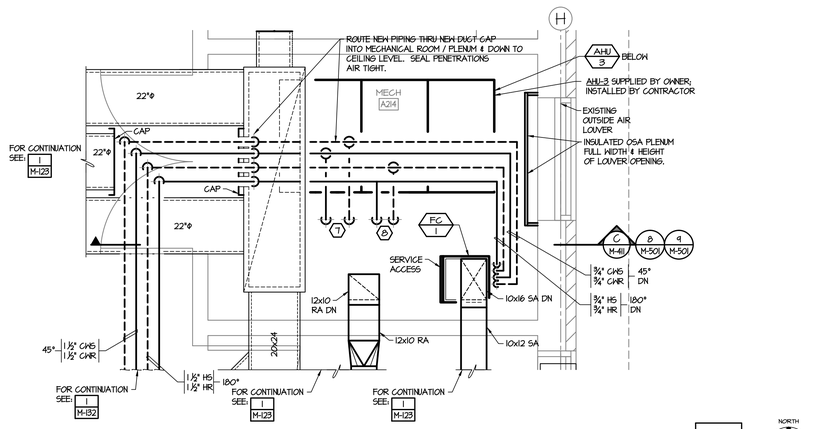
DESIGNED MAW
DRAWN MAW
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

M-132
SHT 17 OF 28



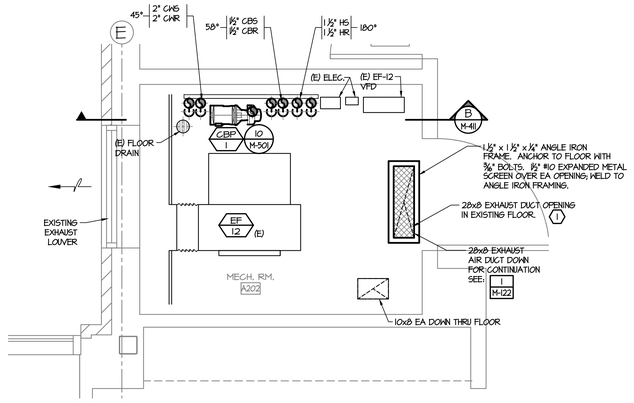
ENLARGED - UPPER MECHANICAL ROOM 1 / M-411

SCALE: 1/2" = 1'-0"



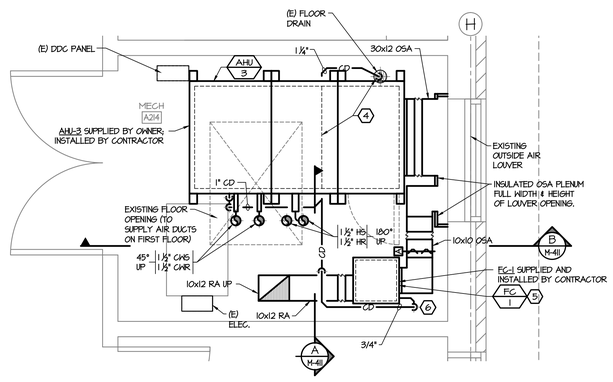
ENLARGED - UPPER MECHANICAL ROOM 2 / M-411

SCALE: 1/2" = 1'-0"



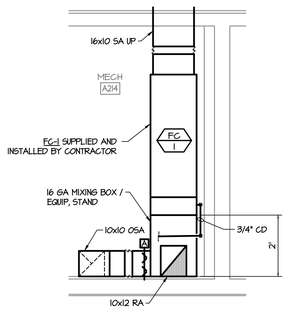
ENLARGED - LOWER MECHANICAL ROOM 3 / M-411

SCALE: 1/2" = 1'-0"



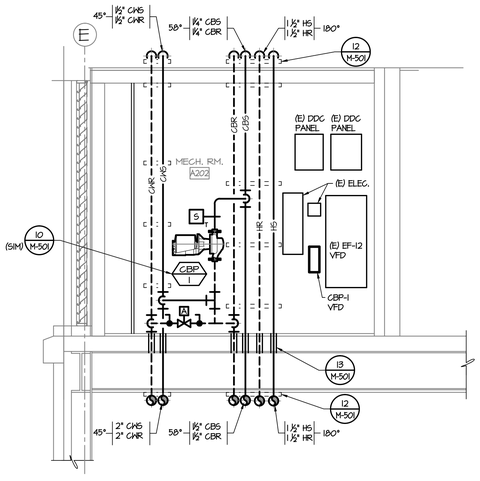
ENLARGED - LOWER MECHANICAL ROOM 4 / M-411

SCALE: 1/2" = 1'-0"



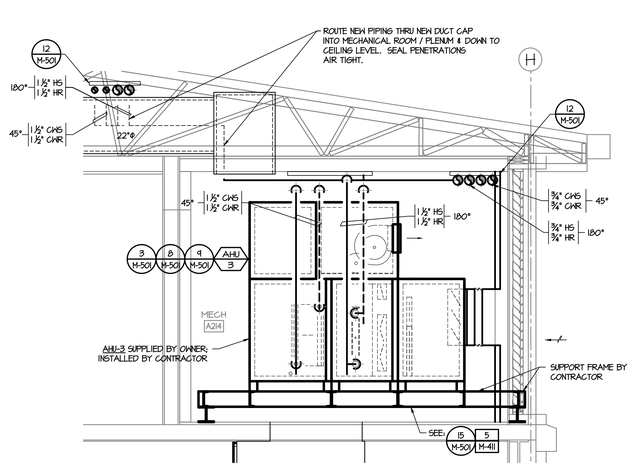
SECTION A / M-411

SCALE: 1/2" = 1'-0"



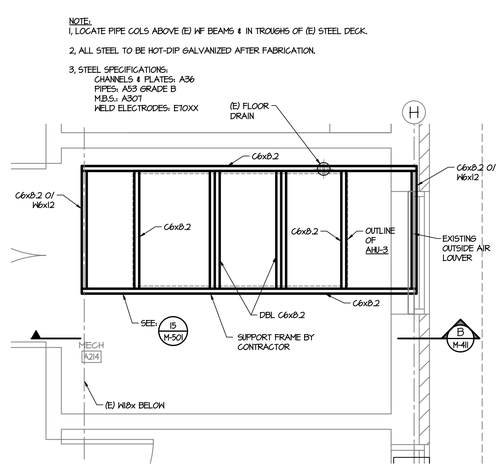
SECTION B / M-411

SCALE: 1/2" = 1'-0"



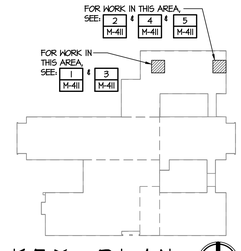
SECTION C / M-411

SCALE: 1/2" = 1'-0"



SUPPORT FRAME - AIR HANDLER 5 / M-411

SCALE: 1/2" = 1'-0"



KEY PLAN

NOT TO SCALE

REFERENCE NOTES:

1. INSTALL NEW EXHAUST AIR DUCT DROP DOWN THRU SECOND FLOOR. PROVIDE ANGLE IRON FRAME AROUND PERIMETER OF DUCT OPENING WITH EXPANDED METAL SCREEN ON DUCT OPENING AT FLOOR AS DUCT PENETRATES EXISTING SOUNDPROOFING IN FLOOR OF MECH. ROOM 202.
2. CAP EXISTING EXHAUST AIR DUCT & PLENUM AS SHOWN.
3. EXTEND EXISTING EXHAUST DUCT ABOVE MECH. ROOM 202, THEN DOWN THROUGH ACOUSTICAL PLENUM. INSTALL MANUAL VOLUME DAMPER ACCESSIBLE FROM INSIDE MECHANICAL ROOM IN DUCT DROP. SEAL WALL & PLENUM PENETRATIONS.
4. ROUTE CONDENSATE DRAIN PIPING BELOW AHU-3 TO EXISTING FLOOR DRAIN.
5. PROVIDE MIXING BOX / FAN COIL SUPPORT STAND BELOW FCU-1. ROUTE RETURN AIR & OUTSIDE AIR DUCT TO THIS MIXING BOX. CONSTRUCT MIXING BOX / SUPPORT STAND FROM 16 GA. SHEET METAL.
6. PROVIDE EXTERNAL CONDENSATE "P"-TRAP IF NOT INCLUDED AS INTERNAL FACTORY INSTALLED OPTION. SHOWN WITH INTERNAL "P"-TRAP.
7. 1½" CHS & CHR (45°) PIPING DOWN.
8. 1½" HS & HR (180°) PIPING DOWN.

SYSTEMS WEST ENGINEERS, INC.
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411 HIGH STREET
EUGENE, OREGON 97401-2427
phone: 541.342.7210
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REGISTERED PROFESSIONAL ENGINEER 11,414 OREGON DEC. 3, 1981 STEVEN P. HOFFMAN EXPIRES: 6-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

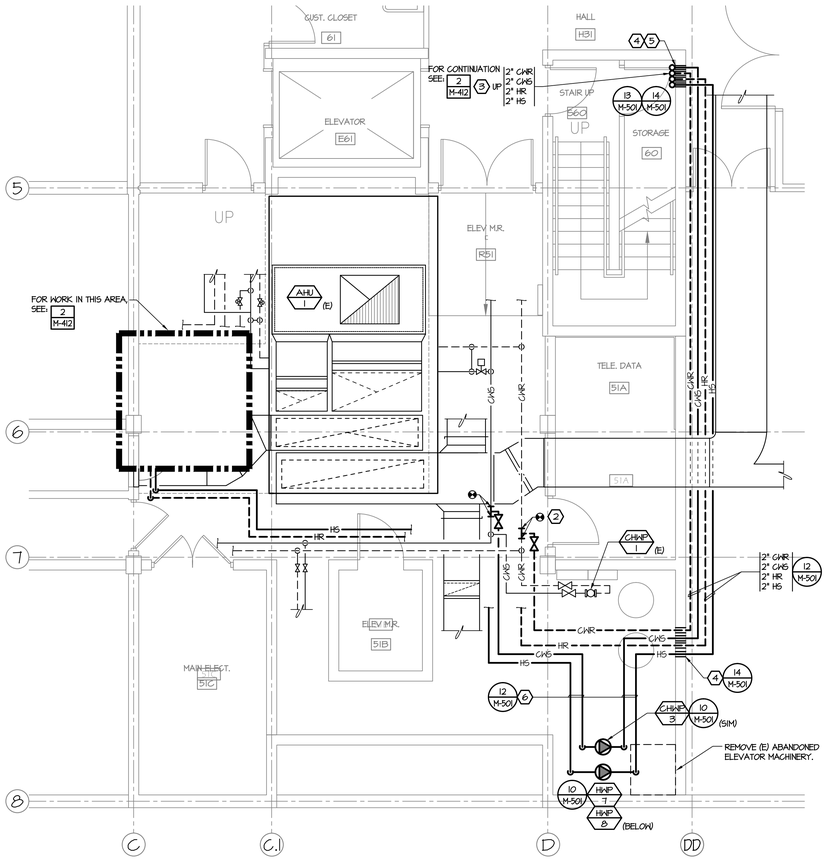
OWNER:
UNIVERSITY of OREGON

ENLARGED MECHANICAL PLANS

MARK	DATE	DESCRIPTION

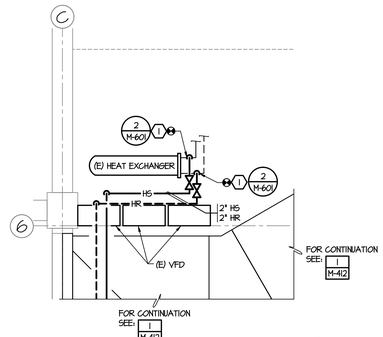
DESIGNED WKB
DRAWN WKB
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

M-411
SHT 18 OF 28



BASEMENT ENLARGED HYDRONIC PIPING PLAN 1 M-412

SCALE: 1/4" = 1'-0"



DETAIL PLAN 2 M-412

SCALE: 1/2" = 1'-0"

REFERENCE NOTES:

1. REMOVE EXISTING TEMPERATURE GAUGES AND REDUCERS. CONNECT 2" HS & HR PIPING TO EXISTING 3" PIPE & TEES. 2/M-601
2. CONNECT NEW 2" CHS & CHR PIPING TO THE EXISTING 4" CHS & CHR PIPING.
3. ROUTE NEW HS, HR, CHS, & CHR UP INTO STAIRWELL ALONGSIDE EXISTING FIRE SPRINKLER PIPING.
4. CORE DRILL EXISTING CONCRETE WALL.
5. CORE DRILL EXISTING FLOOR.

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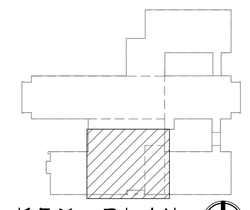


KEY PLAN
NOT TO SCALE

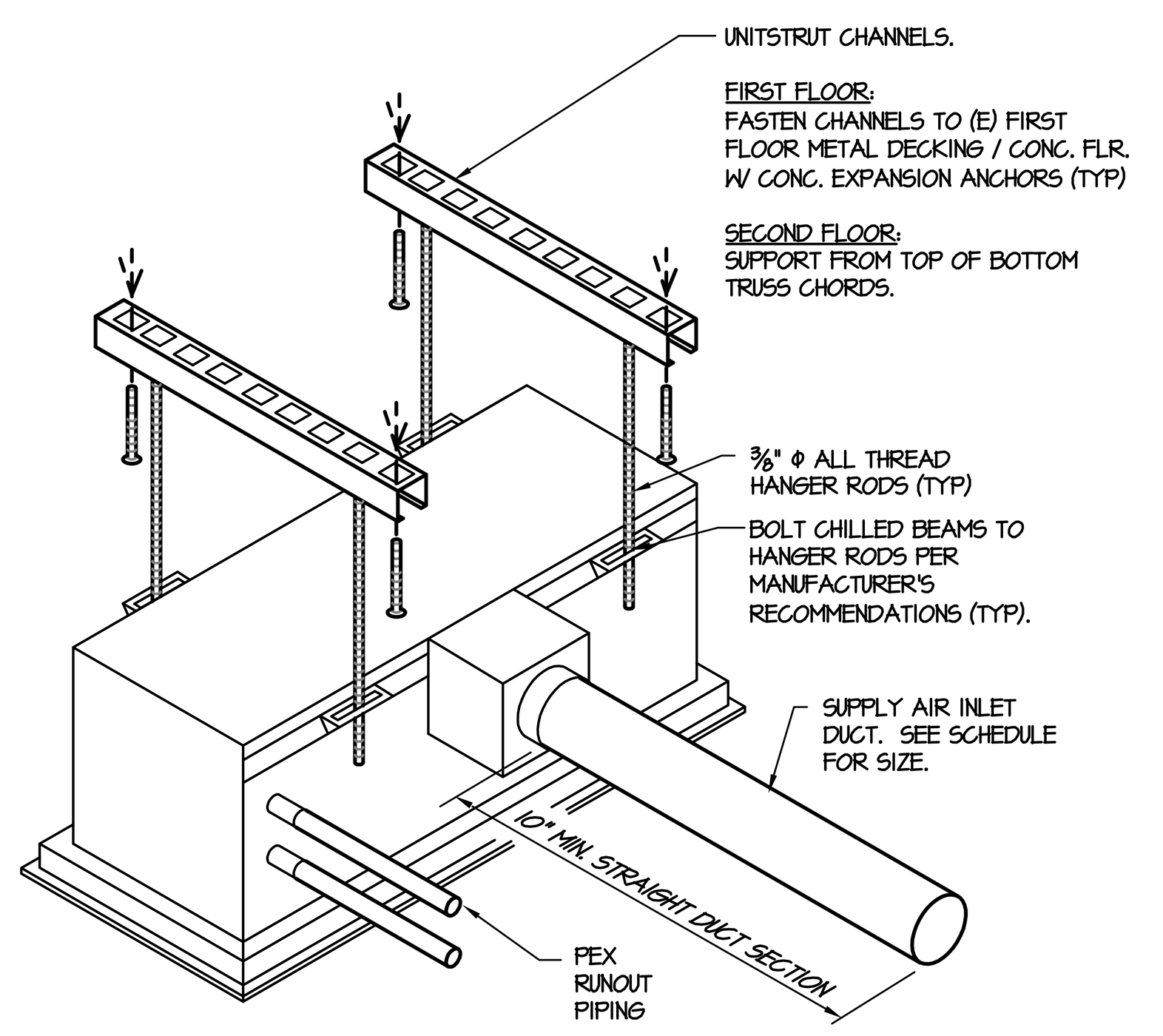
BASEMENT ENLARGED HYDRONIC PIPING PLANS

MARK	DATE	DESCRIPTION

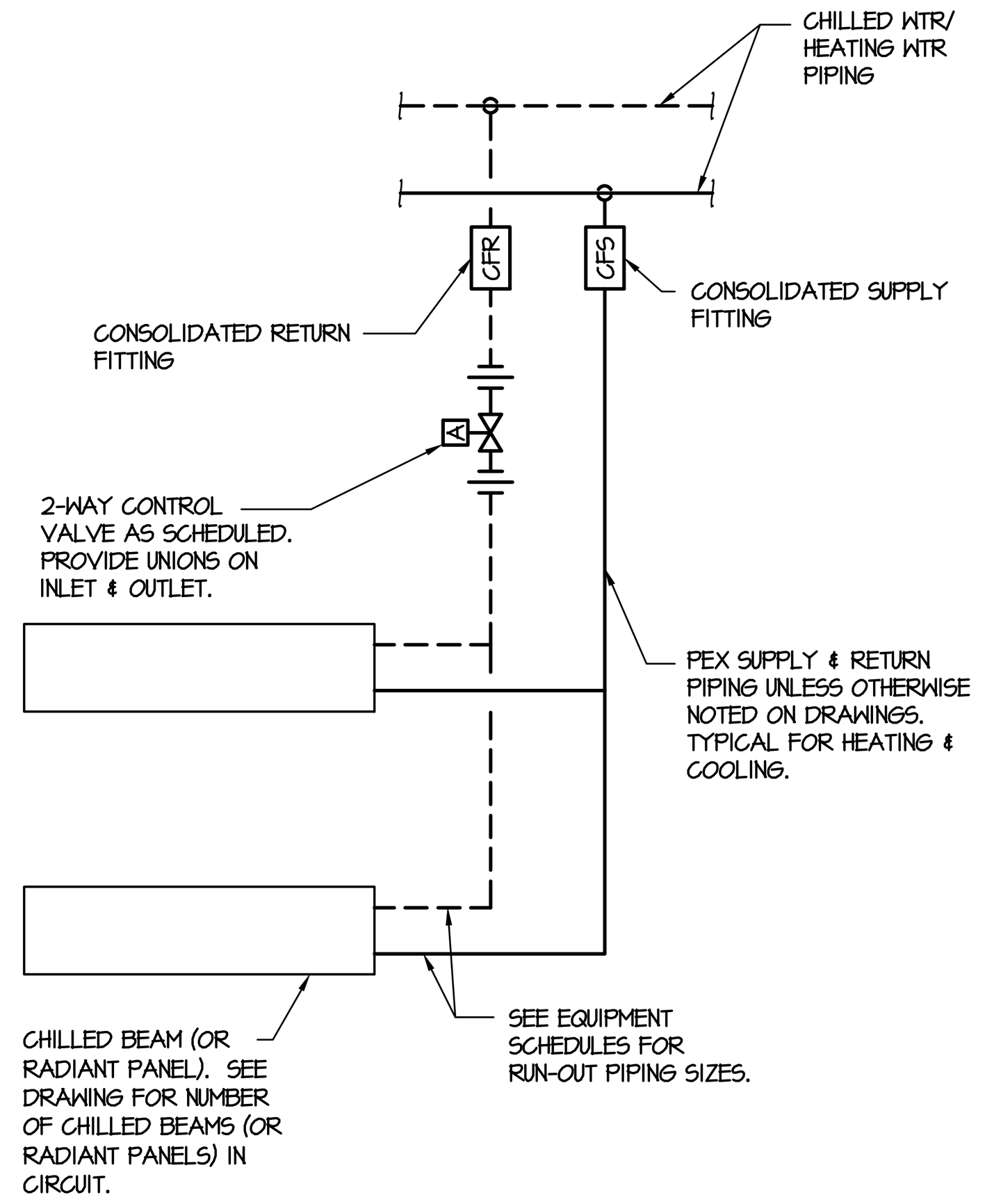
DESIGNED MAW
DRAWN KMG
CHECKED SPH
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

M-412

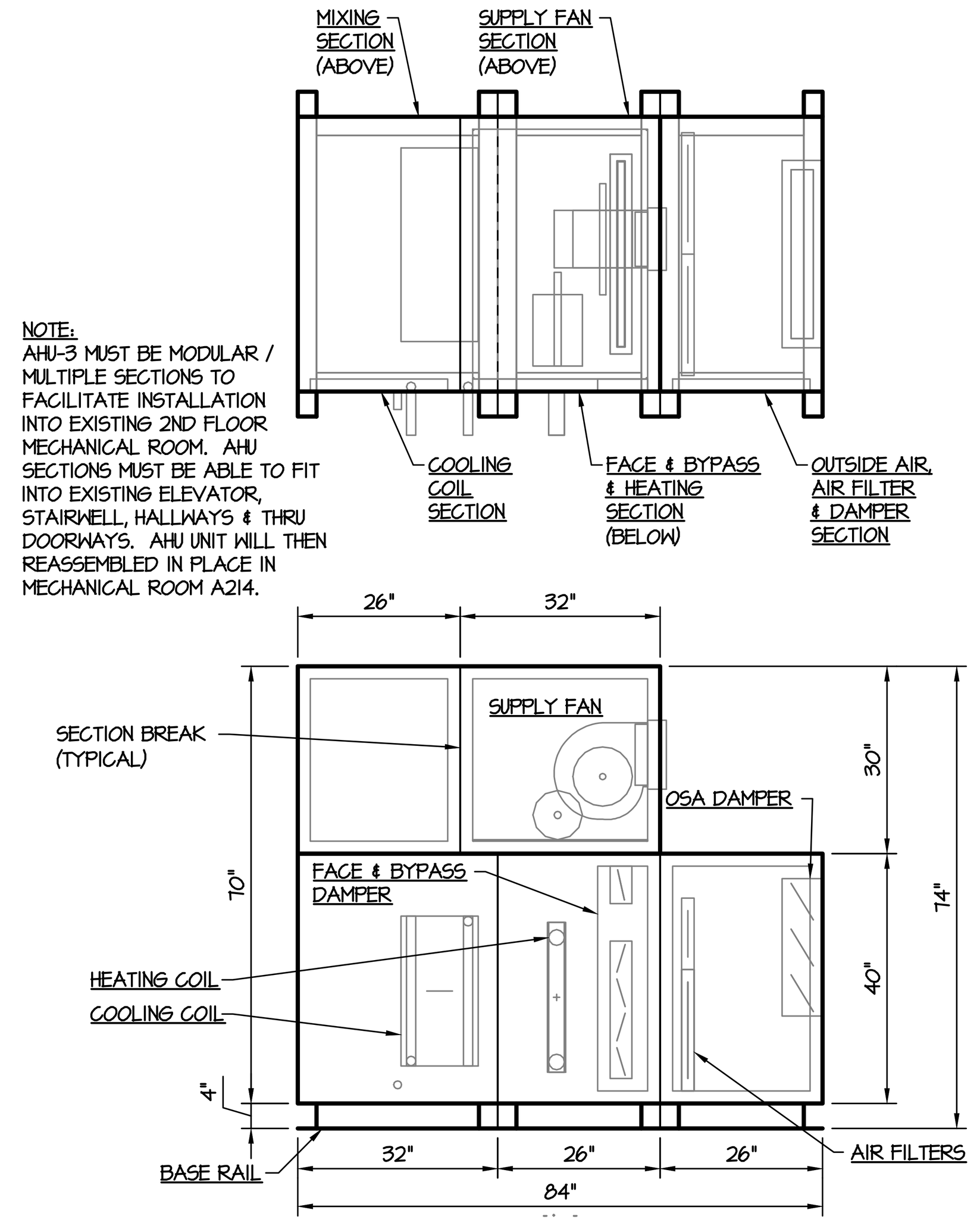
SHT 19 OF 28


UNITSTRUT CHANNELS.
FIRST FLOOR:
FASTEN CHANNELS TO (E) FIRST FLOOR METAL DECKING / CONC. FLR. W/ CONC. EXPANSION ANCHORS (TYP)
SECOND FLOOR:
SUPPORT FROM TOP OF BOTTOM TRUSS CHORDS.
3/8" Φ ALL THREAD HANGER RODS (TYP)
BOLT CHILLED BEAMS TO HANGER RODS PER MANUFACTURER'S RECOMMENDATIONS (TYP).
SUPPLY AIR INLET DUCT. SEE SCHEDULE FOR SIZE.
10" MIN. STRAIGHT DUCT SECTION
PEX RUNOUT PIPING

CHILLED BEAM SUPPORT & CONNECTION DIAGRAM
NOT TO SCALE
1 / M-501


CHILLED WTR/ HEATING WTR PIPING
CFR
CFS
CONSOLIDATED RETURN FITTING
CONSOLIDATED SUPPLY FITTING
A
2-WAY CONTROL VALVE AS SCHEDULED. PROVIDE UNIONS ON INLET & OUTLET.
PEX SUPPLY & RETURN PIPING UNLESS OTHERWISE NOTED ON DRAWINGS. TYPICAL FOR HEATING & COOLING.
CHILLED BEAM (OR RADIANT PANEL). SEE DRAWING FOR NUMBER OF CHILLED BEAMS (OR RADIANT PANELS) IN CIRCUIT.
SEE EQUIPMENT SCHEDULES FOR RUN-OUT PIPING SIZES.

CHILLED BEAM & RADIANT PANEL VALVE & INSTRUMENTATION DIAGRAM
NOT TO SCALE
2 / M-501


MIXING SECTION (ABOVE)
SUPPLY FAN SECTION (ABOVE)
NOTE:
AHU-3 MUST BE MODULAR / MULTIPLE SECTIONS TO FACILITATE INSTALLATION INTO EXISTING 2ND FLOOR MECHANICAL ROOM. AHU SECTIONS MUST BE ABLE TO FIT INTO EXISTING ELEVATOR, STAIRWELL, HALLWAYS & THRU DOORWAYS. AHU UNIT WILL THEN REASSEMBLED IN PLACE IN MECHANICAL ROOM A214.
COOLING COIL SECTION
FACE & BYPASS & HEATING SECTION (BELOW)
OUTSIDE AIR, AIR FILTER & DAMPER SECTION
26"
32"
SECTION BREAK (TYPICAL)
SUPPLY FAN
OSA DAMPER
FACE & BYPASS DAMPER
HEATING COIL
COOLING COIL
70"
30"
40"
74"
4"
BASE RAIL
32"
26"
26"
84"
AIR FILTERS

INDOOR AIR HANDLING UNIT (AHU-3)
NOT TO SCALE
3 / M-501 ⟨1⟩

DETAIL DELETED - NOT USED

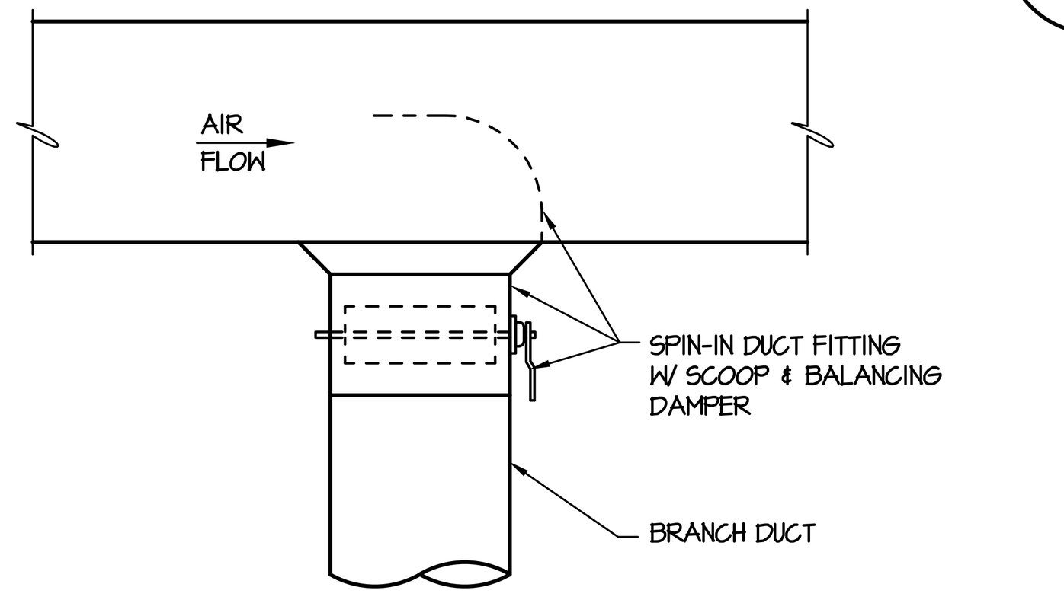
AIR HANDLING UNIT (AHU-4)
NOT TO SCALE
4 / M-501

DETAIL DELETED - NOT USED

AIR HANDLING UNIT CURB (AHU-4)
NOT TO SCALE
5 / M-501

REFERENCE NOTES:

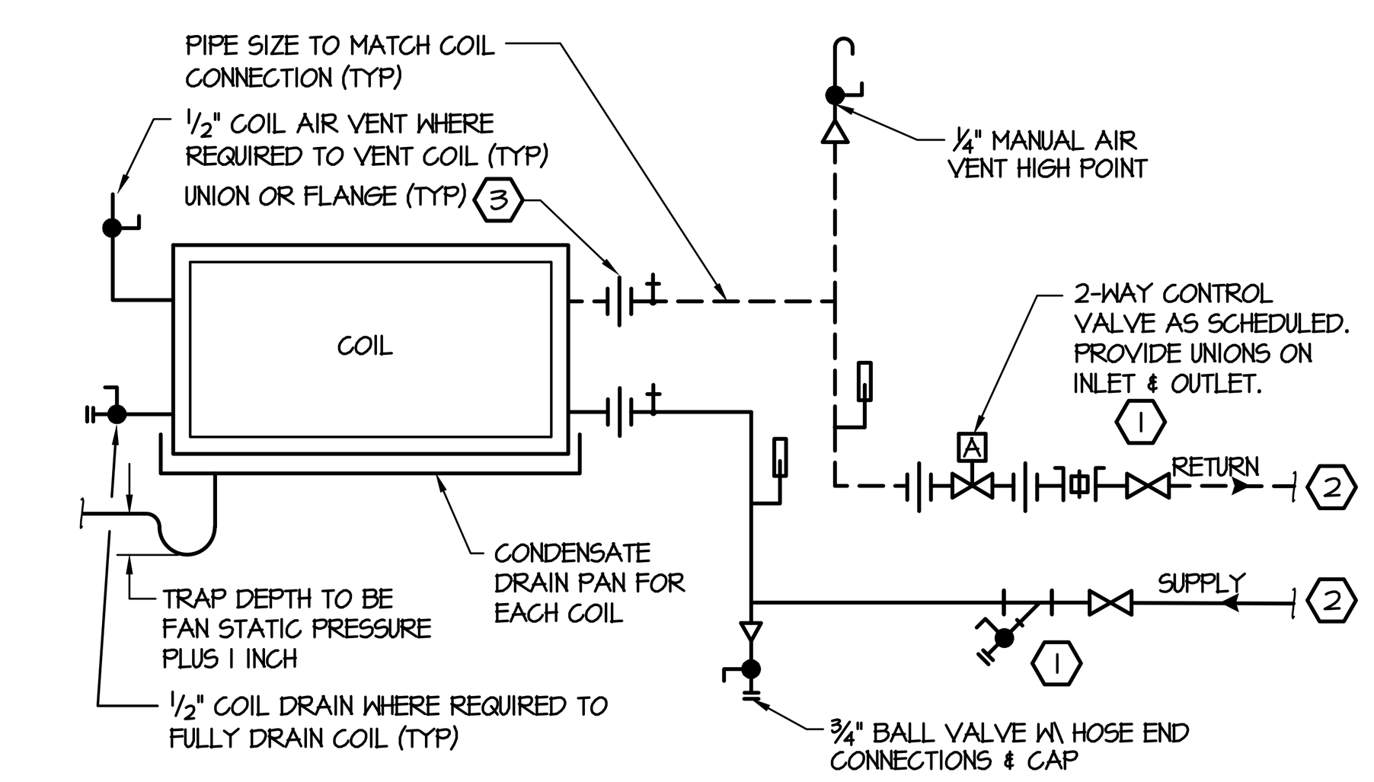
⟨1⟩ DIMENSIONS SHOWN ASSUME BASIS OF DESIGN IS USED. DIMENSIONS ARE PRELIMINARY. INSTALLATION SHALL BE BASED ON APPROVED SHOP DRAWINGS.



DETAIL NOTE:

PROVIDE SPIN-IN FITTING AT ALL DIFFUSER AND CHILLED BEAM BRANCH TAKE-OFFS.

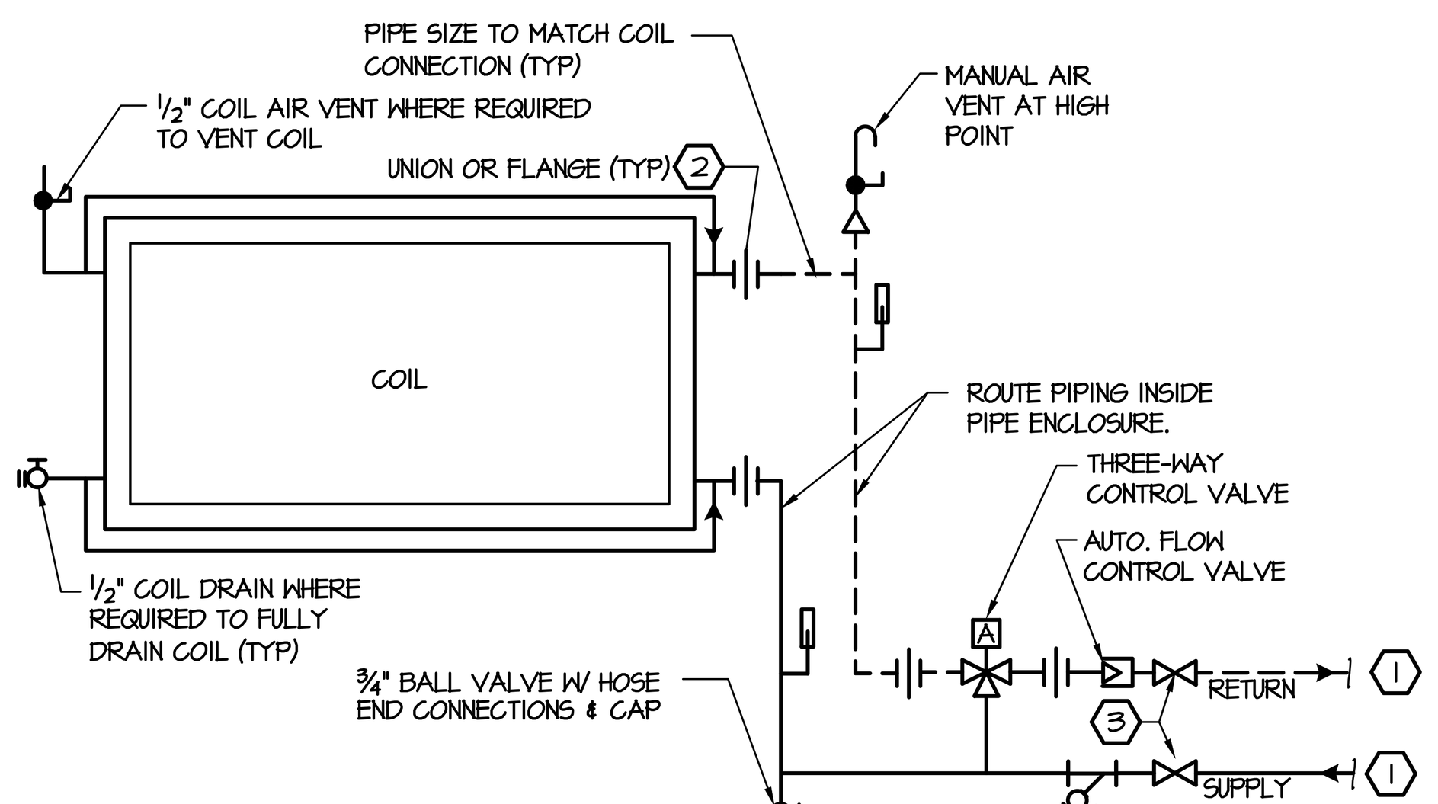
SPIN-IN CONNECTION
NOT TO SCALE
6 / M-501


PIPE SIZE TO MATCH COIL CONNECTION (TYP)
1/2" COIL AIR VENT WHERE REQUIRED TO VENT COIL (TYP)
UNION OR FLANGE (TYP) 3
1/4" MANUAL AIR VENT HIGH POINT
COIL
2-WAY CONTROL VALVE AS SCHEDULED. PROVIDE UNIONS ON INLET & OUTLET.
A
1
RETURN
2
SUPPLY
2
CONDENSATE DRAIN PAN FOR EACH COIL
TRAP DEPTH TO BE FAN STATIC PRESSURE PLUS 1 INCH
1/2" COIL DRAIN WHERE REQUIRED TO FULLY DRAIN COIL (TYP)
3/4" BALL VALVE W\ HOSE END CONNECTIONS & CAP

DETAIL 8/M-501 NOTES:

1. PROVIDE GATE VALVES FOR ISOLATION ON COIL PIPING 2 1/2" AND LARGER, AND BALL VALVES FOR PIPING 2" INCH AND SMALLER.
2. PIPE SIZE AS SHOWN ON DRAWINGS.
3. PROVIDE DIELECTRIC UNION BETWEEN DISSIMILAR PIPING MATERIALS

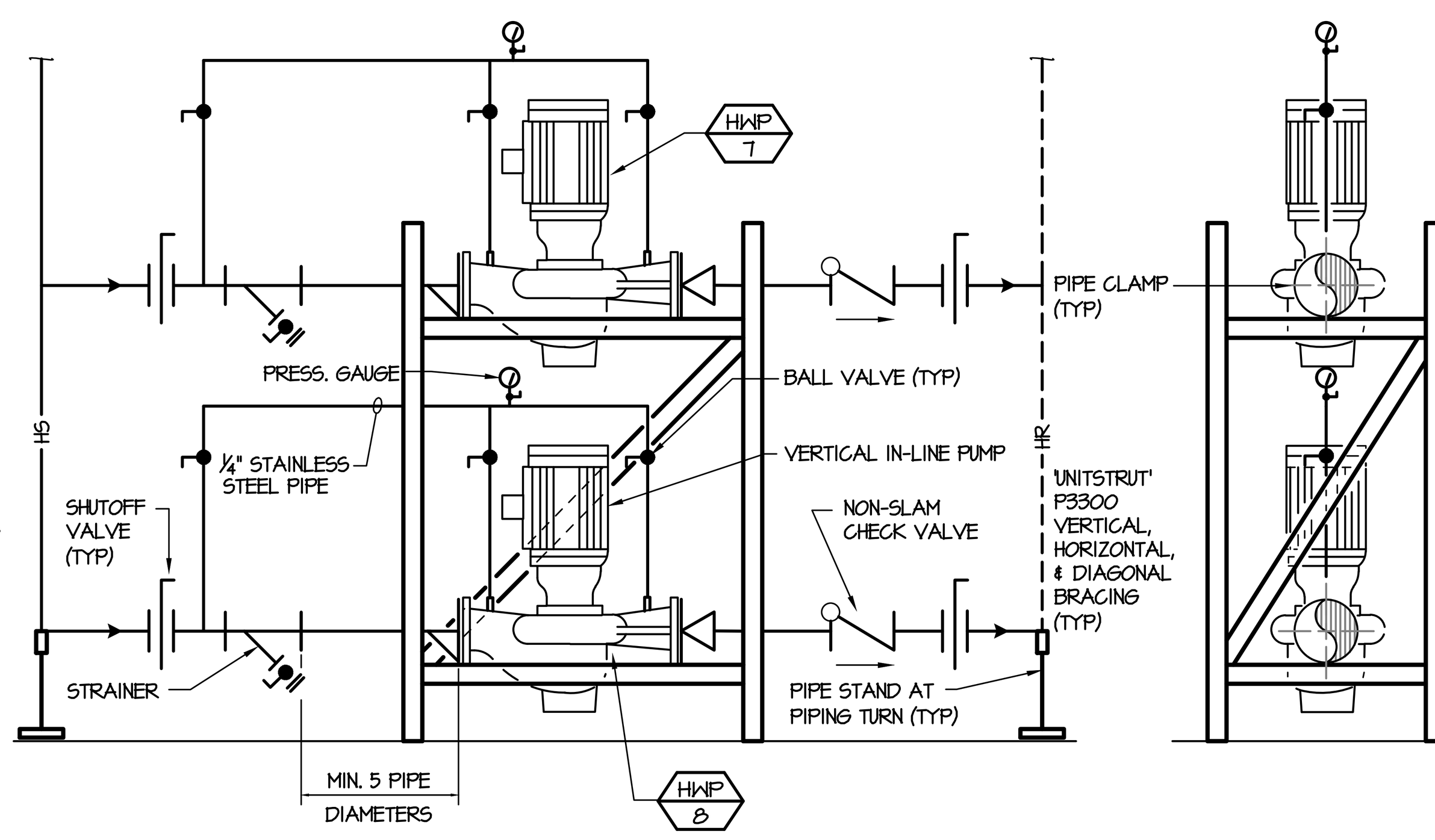
COOLING COIL
NOT TO SCALE
8 / M-501


PIPE SIZE TO MATCH COIL CONNECTION (TYP)
1/2" COIL AIR VENT WHERE REQUIRED TO VENT COIL
UNION OR FLANGE (TYP) 2
MANUAL AIR VENT AT HIGH POINT
COIL
ROUTE PIPING INSIDE PIPE ENCLOSURE.
THREE-WAY CONTROL VALVE
AUTO. FLOW CONTROL VALVE
A
3
RETURN
1
SUPPLY
1
1/2" COIL DRAIN WHERE REQUIRED TO FULLY DRAIN COIL (TYP)
3/4" BALL VALVE W/ HOSE END CONNECTIONS & CAP

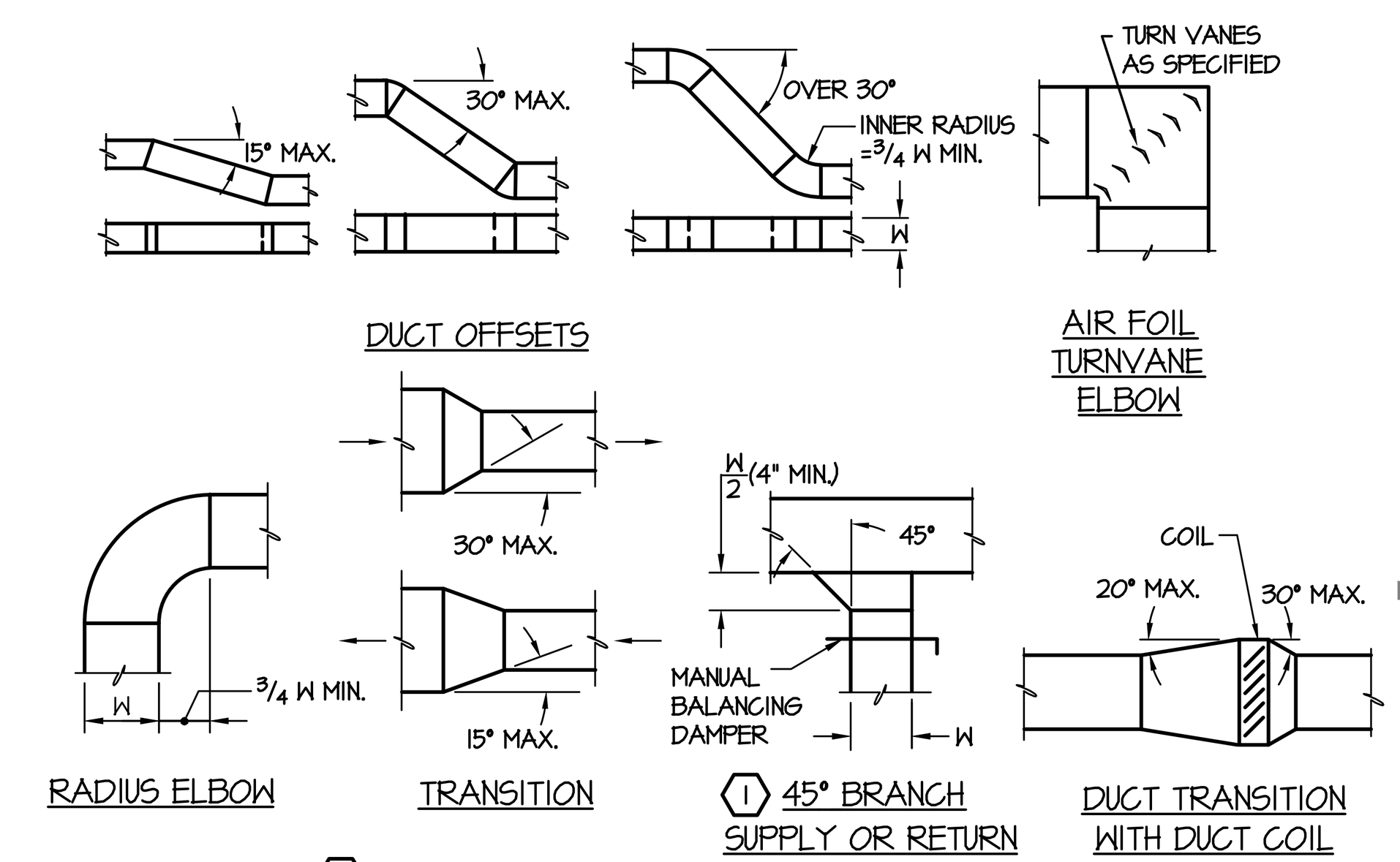
DETAIL 9/M-501 NOTES:

1. PIPE SIZE AS SHOWN ON DRAWINGS.
2. PROVIDE DIELECTRIC UNION BETWEEN DISSIMILAR PIPING MATERIALS.
3. PROVIDE GATE VALVES FOR ISOLATION ON COIL PIPING 2 1/2" AND LARGER, AND BALL VALVES FOR PIPING 2" INCH AND SMALLER.

HEATING COIL
NOT TO SCALE
9 / M-501


HWP 7
HS
HR
PIPE CLAMP (TYP)
PRESS. GAUGE
BALL VALVE (TYP)
1/4" STAINLESS STEEL PIPE
VERTICAL IN-LINE PUMP
SHUTOFF VALVE (TYP)
NON-SLAM CHECK VALVE
'UNITSTRUT' P3300 VERTICAL, HORIZONTAL, & DIAGONAL BRACING (TYP)
STRAINER
PIPE STAND AT PIPING TURN (TYP)
MIN. 5 PIPE DIAMETERS
HWP 8

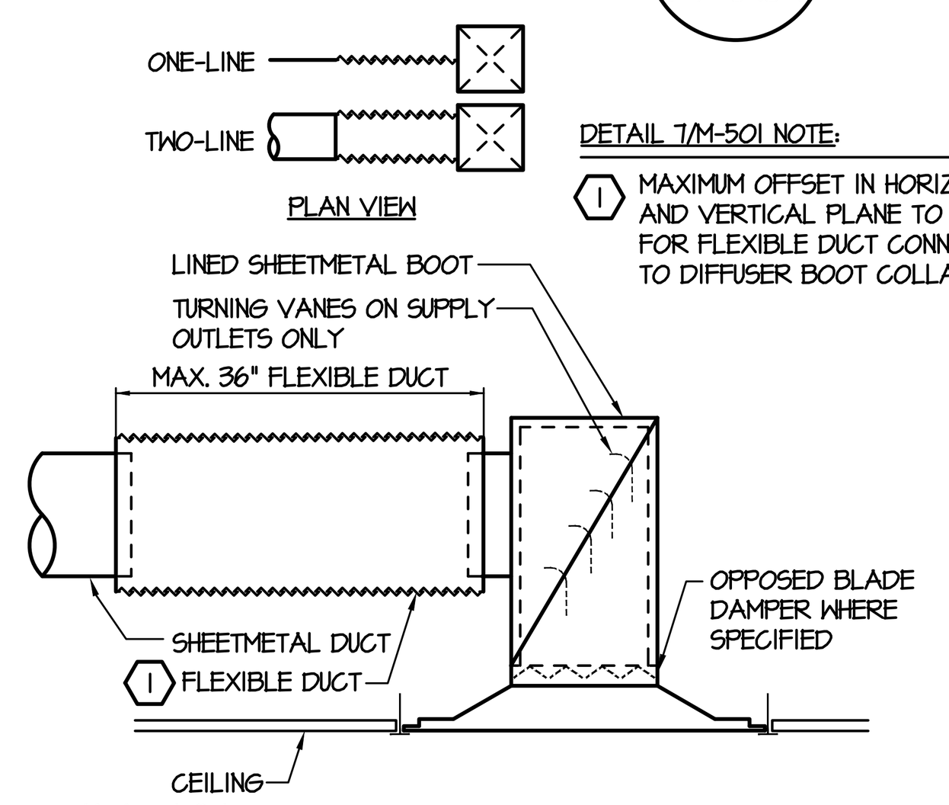
STACKED VERTICAL IN-LINE PUMP INSTALLATION
NOT TO SCALE
10 / M-501


15° MAX.
30° MAX.
OVER 30°
INNER RADIUS =3/4 W MIN.
W
TURN VANES AS SPECIFIED
DUCT OFFSETS
AIR FOIL TURNVANE ELBOW
W/2 (4" MIN.)
45°
30° MAX.
15° MAX.
3/4 W MIN.
W
MANUAL BALANCING DAMPER
COIL
20° MAX.
30° MAX.
RADIUS ELBOW
TRANSITION
1 45° BRANCH SUPPLY OR RETURN
DUCT TRANSITION WITH DUCT COIL

⟨1⟩ PROVIDE AIR EXTRACTOR WITH EXTERNAL OPERATING KNOB WHERE 45° BRANCH TAKEOFF CANNOT BE INSTALLED.

(DUCT LINER NOT SHOWN FOR CLARITY.)

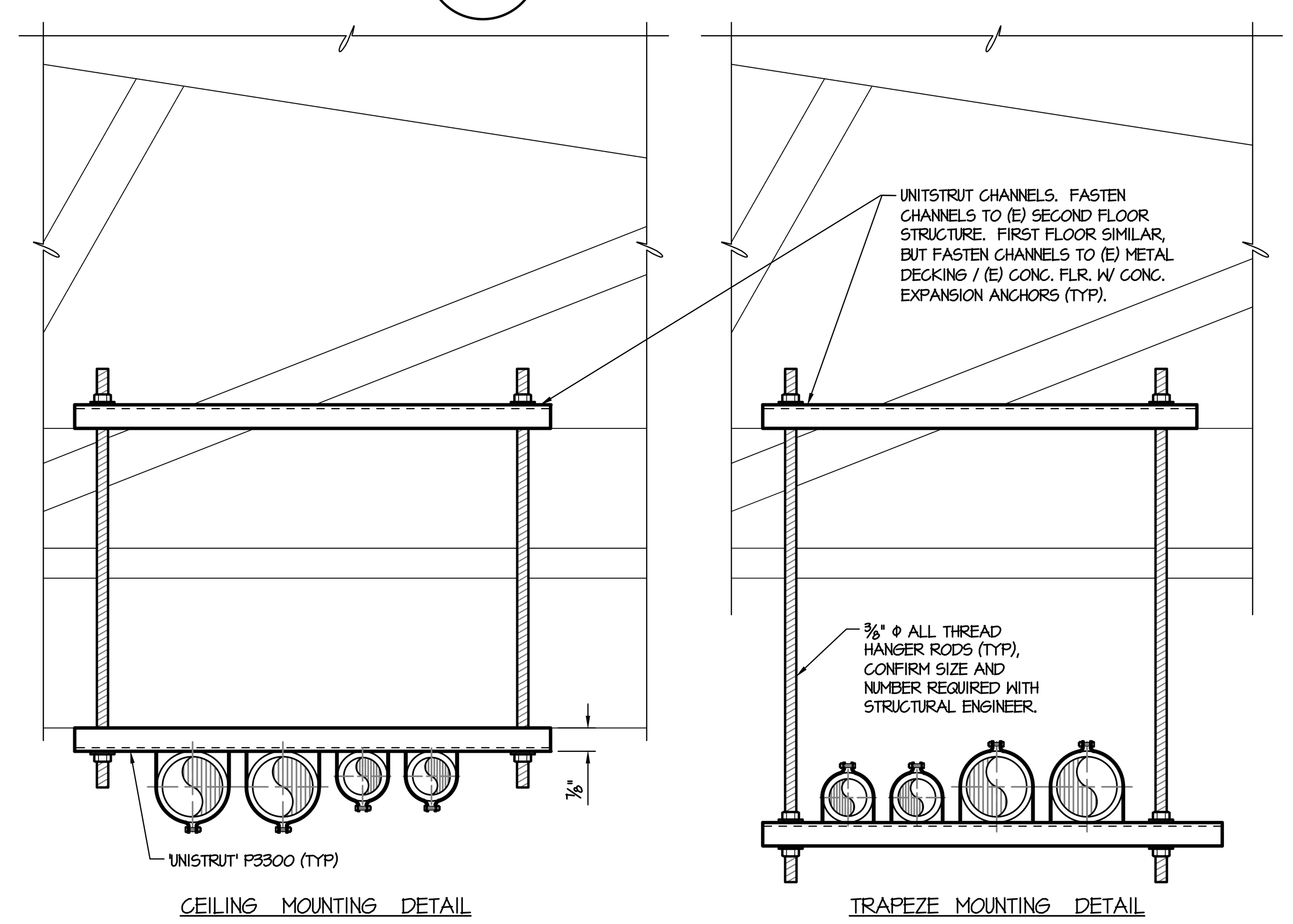
LOW VELOCITY DUCT CONSTRUCTION
NOT TO SCALE
11 / M-501



DETAIL 7/M-501 NOTE:

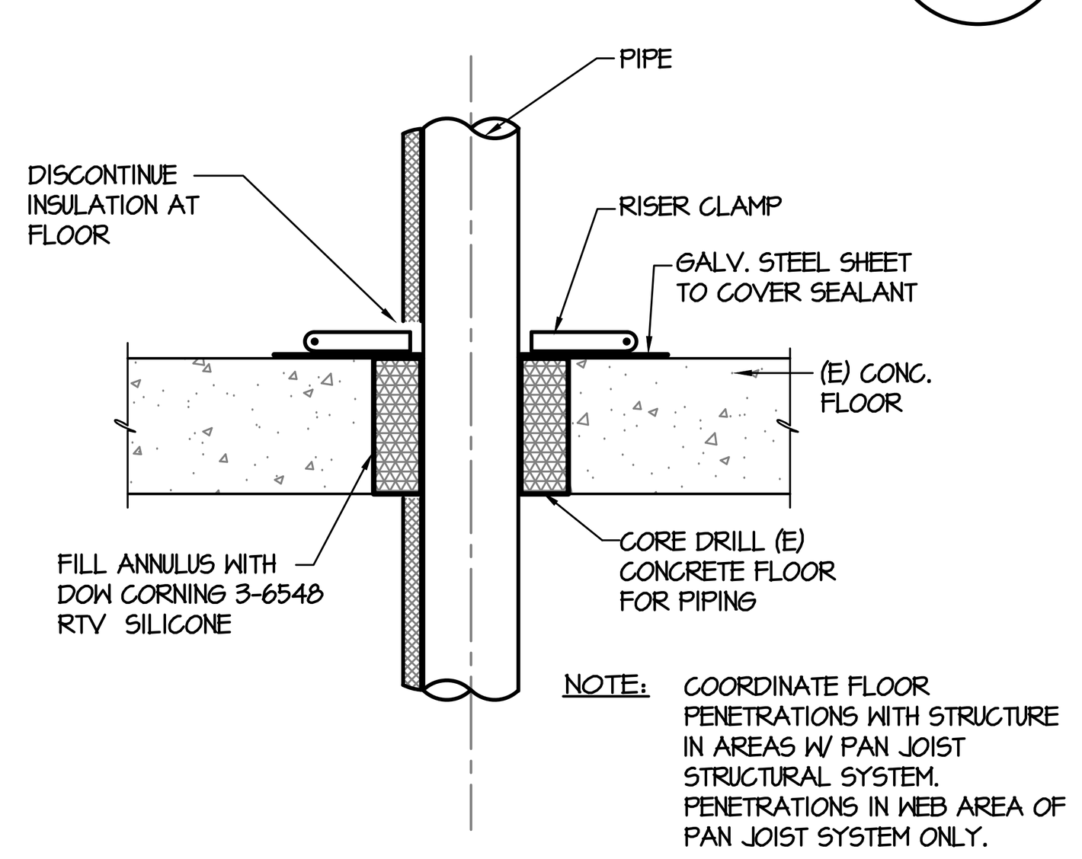
⟨1⟩ MAXIMUM OFFSET IN HORIZONTAL AND VERTICAL PLANE TO BE 15° FOR FLEXIBLE DUCT CONNECTION TO DIFFUSER BOOT COLLAR.

DIFFUSER & REGISTER CONNECTION
NOT TO SCALE
7 / M-501


UNITSTRUT CHANNELS. FASTEN CHANNELS TO (E) SECOND FLOOR STRUCTURE. FIRST FLOOR SIMILAR, BUT FASTEN CHANNELS TO (E) METAL DECKING / (E) CONC. FLR. W/ CONC. EXPANSION ANCHORS (TYP).
3/8" Φ ALL THREAD HANGER RODS (TYP), CONFIRM SIZE AND NUMBER REQUIRED WITH STRUCTURAL ENGINEER.
7/8"
'UNISTRUT' P3300 (TYP)
CEILING MOUNTING DETAIL
TRAPEZE MOUNTING DETAIL

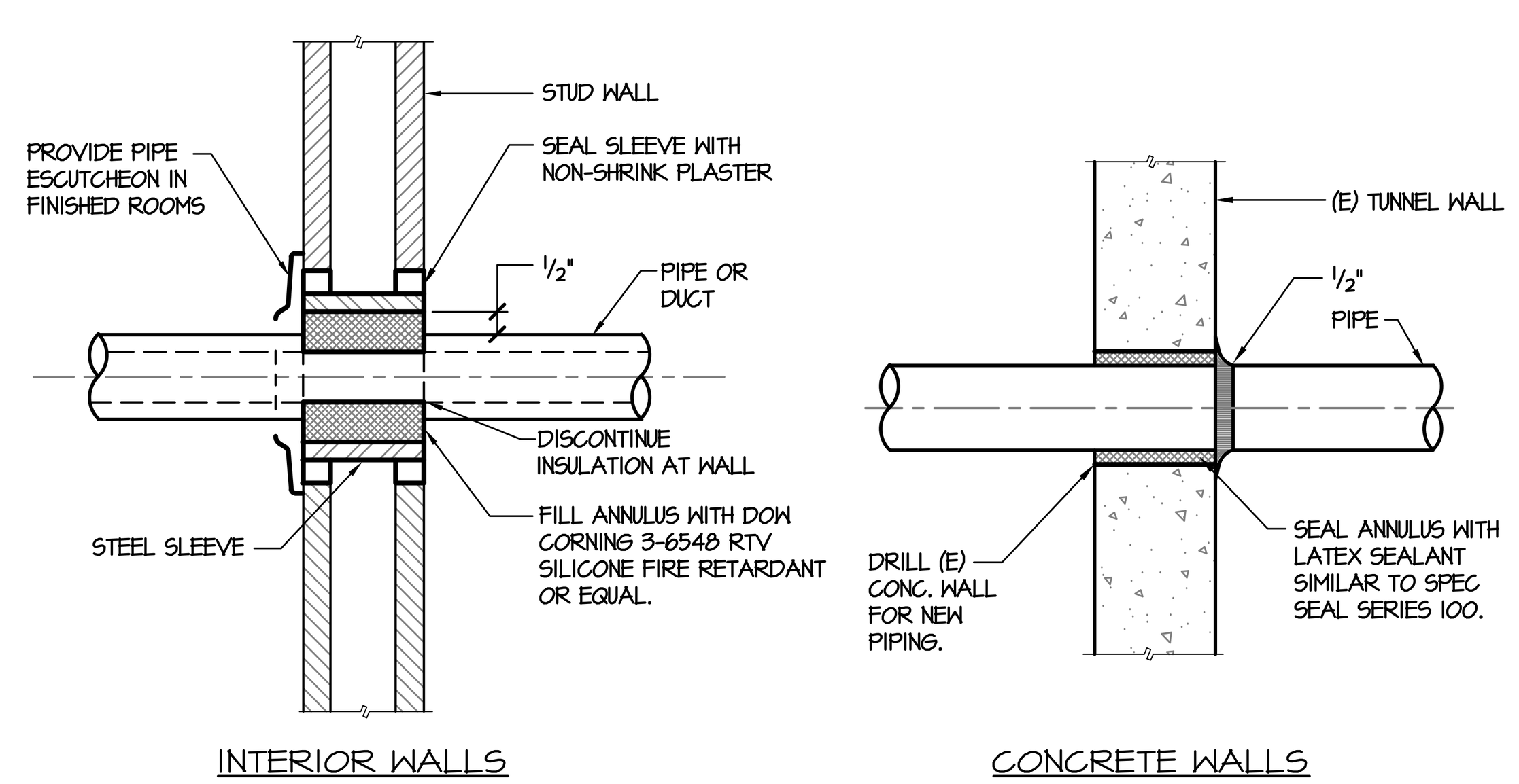
NOTE: IN GENERAL, KEEP PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE LAYOUT WITH OTHER TRADES.

PIPING SUPPORT AT CEILING
NOT TO SCALE
12 / M-501



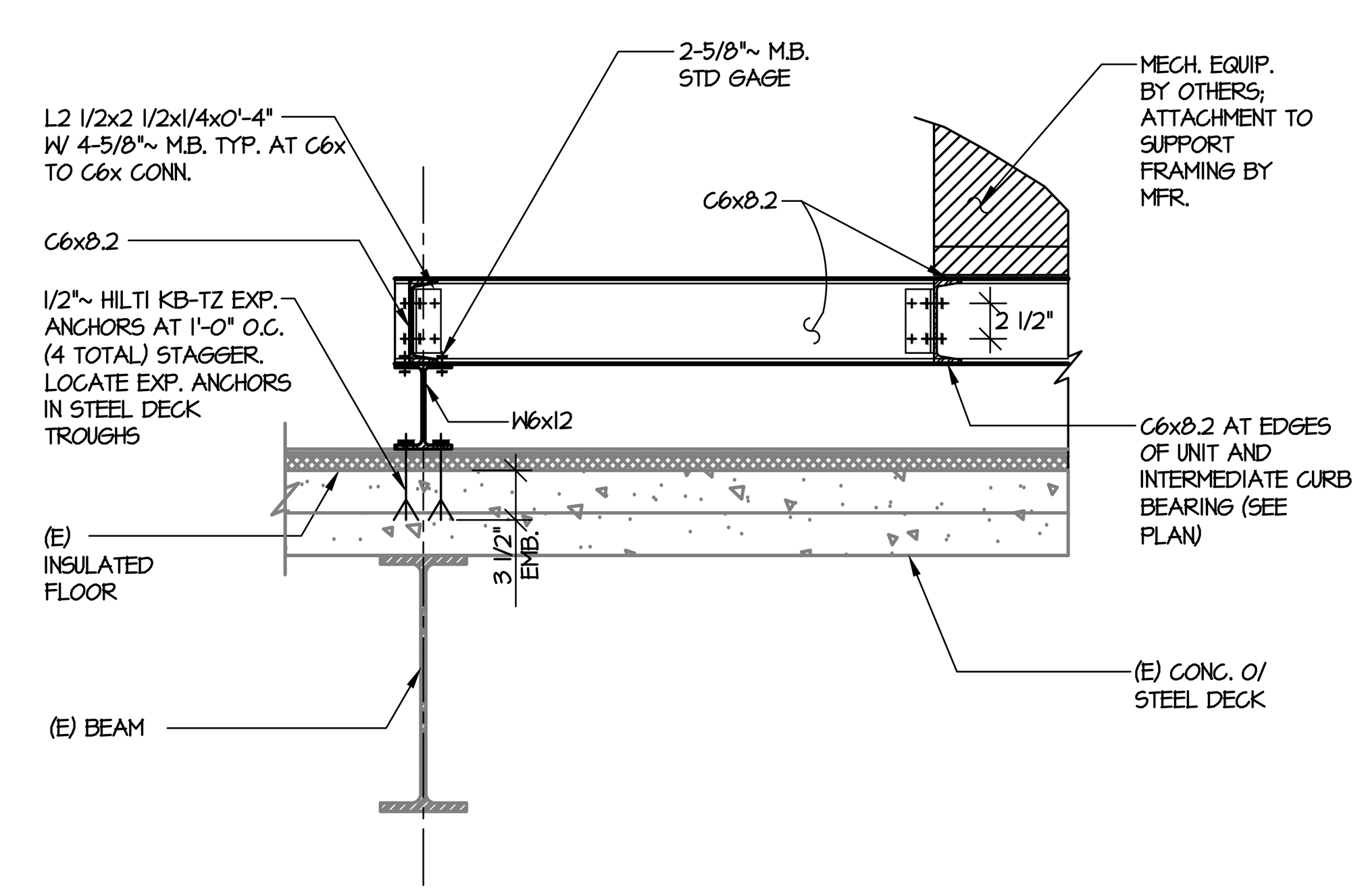
NOTE: COORDINATE FLOOR PENETRATIONS WITH STRUCTURE IN AREAS W/ PAN JOIST STRUCTURAL SYSTEM. PENETRATIONS IN WEB AREA OF PAN JOIST SYSTEM ONLY.

ROOF & FLOOR PENETRATION
NOT TO SCALE
13 / M-501


STUD WALL
PROVIDE PIPE ESCUTCHEON IN FINISHED ROOMS
SEAL SLEEVE WITH NON-SHRINK PLASTER
1/2"
PIPE OR DUCT
DISCONTINUE INSULATION AT WALL
FILL ANNULUS WITH DOW CORNING 3-6548 RTV SILICONE FIRE RETARDANT OR EQUAL.
STEEL SLEEVE
INTERIOR WALLS
(E) TUNNEL WALL
1/2"
PIPE
DRILL (E) CONC. WALL FOR NEW PIPING.
SEAL ANNULUS WITH LATEX SEALANT SIMILAR TO SPEC SEAL SERIES 100.
CONCRETE WALLS

WALL PENETRATIONS
NOT TO SCALE
14 / M-501

NOTES:
1. INSTALL EXP. ANCHORS PER ICCESR-1917 AND MRF'S INSTRUCTIONS.


2-5/8"~ M.B. STD GAGE
MECH. EQUIP. BY OTHERS; ATTACHMENT TO SUPPORT FRAMING BY MFR.
L2 1/2x2 1/2x1/4x0'-4" W/ 4-5/8"~ M.B. TYP. AT C6x TO C6x CONN.
C6x8.2
C6x8.2
2 1/2"
1/2"~ HILTI KB-TZ EXP. ANCHORS AT 1'-0" O.C. (4 TOTAL) STAGGER. LOCATE EXP. ANCHORS IN STEEL DECK TROUGHS
W6x12
C6x8.2 AT EDGES OF UNIT AND INTERMEDIATE CURB BEARING (SEE PLAN)
(E) INSULATED FLOOR
3 1/2" EMB.
(E) CONC. O/ STEEL DECK
(E) BEAM

AHU-3 STRUCTURAL SUPPORT FRAMING
NOT TO SCALE
15 / M-501

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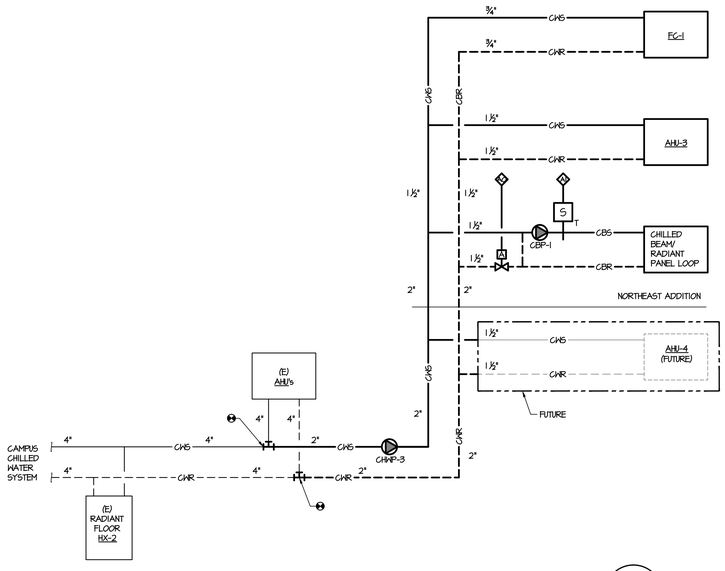
DETAILS

MARK	DATE	DESCRIPTION

DESIGNED	WKB
DRAWN	MCM
CHECKED	SPH
SCALE	NOTED
DATE	13FEB2012
PROJECT	K010.06

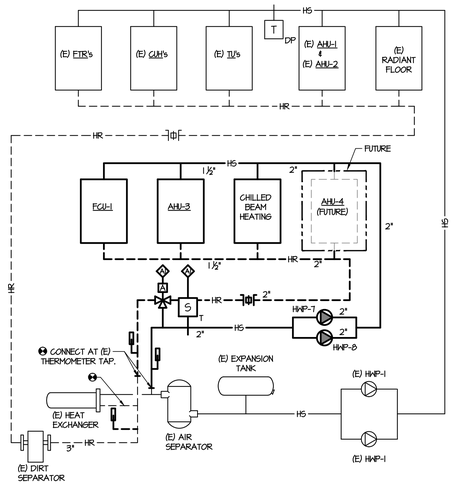
M-501

SHT 20 OF 28



CHILLED WATER PIPING DIAGRAM 1 M-601

NOT TO SCALE



HEATING WATER PIPING DIAGRAM 2 M-601

NOT TO SCALE

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M-601

SHT 21 OF 28

SYMBOLS AND ABBREVIATIONS LEGEND

DIVISION 26 05 19: LOW-VOLTAGE ELECTRICAL CONDUCTORS & CABLES

HOMERUN

—F— SIGNAL WIRING: F = FIRE ALARM, I = INTERCOM, C= LOW VOLTAGE CONTROL, T= TELEPHONE, D= DATA, TV = TELEVISION, P= CLOCK PROGRAM, PC = PHOTO CONTROL

DIVISION 26 05 26: GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

GROUND

DIVISION 26 22 13: LOW-VOLTAGE DISTRIBUTION

ELECTRICAL EQUIPMENT AS INDICATED ON DRAWINGS

DIVISION 26 24 16: PANELBOARDS

PANELBOARD

DIVISION 26 51 00: LIGHTING FIXTURES

FLUORESCENT LUMINAIRE IN 4', 8', & 12' LENGTHS, MOUNTED END-TO-END WHERE SHOWN.

FLUORESCENT LUMINAIRE IN 4', 8', & 12' LENGTHS, MOUNTED END-TO-END WHERE SHOWN. SHADING INDICATES EMERGENCY LIGHT FIXTURE.

DIVISION 26 29 13: MOTOR & CIRCUIT DISCONNECTS

DISCONNECT SWITCH

MOTOR STARTER

COMBINATION MOTOR STARTER/DISCONNECT SWITCH

T$ MANUAL MOTOR STARTER WITH THERMAL OVERLOAD PROTECTION & LOCKABLE OFF COVER

DIVISION 26 27 26: WIRING DEVICES

$a3 SWITCH. "a"= CIRCUITS CONTROLLED, "K"= KEY SWITCH, "P"= W/PILOT LIGHT, "2"= DOUBLE POLE, "3"= THREE-WAY,
"M"= AUTOMATIC WALL SWITCH, "D"= DIMMING SWITCH
"TS"= DIGITAL TIMER SWITCH

PUSH BUTTON

DIVISION 26 05 33: RACEWAYS & BOXES FOR ELECTRICAL SYSTEMS

JUNCTION BOX

GENERAL

EF 1 — EQUIPMENT IDENTIFIER, EXHAUST FAN 1 SHOWN

2 — SHEET REFERENCE NOTE

2 / E-121, 2 / E-501 — PLAN OR DETAIL NUMBER / SHEET NUMBER

123 — ROOM NUMBER

EXISTING WORK SHOWN LIGHT

NEW WORK SHOWN BOLD

EXISTING TO BE REMOVED

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
BLDG	BLDG
C	CONDUIT
CKT	CIRCUIT
DSP	DIGITAL SIGNAL PROCESSOR
(E)	EXISTING
ELEC	ELECTRICAL
EMERG	EMERGENCY
GND	GROUND
HVAC	HEATING, VENTILATING, & AIR CONDITIONING
L.V.	LOW VOLTAGE
MECH	MECHANICAL
(N)	NEW
(E)	EXISTING
PNL	PANEL

GENERAL NOTES:

1. THE FACILITY WILL REMAIN IN OPERATION DURING CONSTRUCTION. COORDINATE ALL SHUTDOWNS AND CONSTRUCTION ACTIVITY WITH FACILITIES STAFF.
2. SIZE AND LOCATION OF ALL EXISTING ELECTRICAL EQUIPMENT IS APPROXIMATE. CONTRACTOR SHALL SITE VERIFY THE EXACT LOCATION OF EXISTING AND CONSTRUCT ALL WORK FROM FIELD DIMENSIONS. CONTRACTOR SHALL MAKE ADJUSTMENTS NECESSARY TO ACCOMMODATE MINOR DEVIATIONS AT NO COST TO OWNER.
3. LIGHT LINE WORK INDICATES EXISTING ELECTRICAL CIRCUITRY AND OTHER ELECTRICAL EQUIPMENT. DASHED LINE WORK INDICATES ELECTRICAL DEVICES AND EQUIPMENT TO BE REMOVED.
4. WHERE EXISTING EQUIPMENT IS REMOVED AND NOT REPLACED IN THE SAME LOCATION, PATCH AND PAINT SURFACES TO MATCH ORIGINAL CONDITION.
5. REMOVE ALL ABANDONED RACEWAY AND WIRING.
6. RECONNECT ALL CIRCUITRY TO REMAINING DEVICES AND EQUIPMENT.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	EXAMPLE MANUFACTURER	LAMP	NOTES
A	4"Wx4"Hx4'L NOMINAL SPECULAR PARABOLIC BLACK LOUVER	SELUX M100 SERIES LITECONTROL M00-44 SERIES	(1) 30-WATT 4' T8 SUPERSA LINEAR FLOUR (32W)	MOUNTING :RECESSED HOUSING :STEEL LENS/REFL : VOLTAGE :120V BALLAST :ELECTRONIC PRS MISC :
A1	4"Wx4"Hx4'L NOMINAL SPECULAR PARABOLIC BLACK LOUVER	SELUX M100 SERIES LITECONTROL M00-44 SERIES	(1) 30-WATT 4' T8 SUPERSA LINEAR FLOUR (32W)	MOUNTING :SUSPENDED FROM CEILING & RECESSED WITH WOOD SURFACE, CABLE MOUNT HOUSING :STEEL LENS/REFL : VOLTAGE :120V BALLAST :ELECTRONIC PRS MISC :

PANEL P SCHEDULE

SERVICE: 208/120 VOLTS 3ø 4 WIRE
CAPACITY: 100 AMP BUS 22000 SCA AVAIL
100 AMP LUGS
FED FROM: MDP SURFACE MOUNTED

DESCRIPTION	LOAD (AMP)	BREAKER (AMP/POLE)	CIRCUIT AND PHASE	BREAKER (AMP/POLE)	LOAD (AMP)	DESCRIPTION
CHWP-3	7.5	20/3	1 A 2A	20/3	7.5	HWP-7
	7.5		3 B 4B		7.5	
	7.5		5 C 6C		7.5	
HWP-8	7.5	20/3	7 A 8A	20/1	5.0	Control pnls
	7.5		9 B 10B	20/1	0.0	Spare
	7.5		11 C 12C	20/1	0.0	Spare
Spare	0.0	20/1	13 A 14A	20/1	0.0	Spare
Spare	0.0	20/1	15 B 16B	20/1	0.0	Spare
Spare	0.0	20/1	17 C 18C	20/1	0.0	Spare
Space			19 A 20A			Space
Space			21 B 22B			Space
Space			23 C 24C			Space

SUMMARY:

AMP LOAD	A	B	C
CONNECTED	27.5	22.5	22.5
DEMAND	27.5	22.5	22.5
DEMAND LOAD			27.5
SPARE LOAD			4.1
CONT LOAD			0.0
TOTAL LOAD			31.6
GROWTH			3.2
DESIGN LOAD			34.8

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REGISTERED PROFESSIONAL ENGINEER 11,350 OREGON SEPT. 25, 1981 JEFFREY L. GRAPER EXPIRES 06-30-13

[illegible]

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
1590 E. 13th Avenue
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON

ELECTRICAL LEGEND & SCHEDULE

MARK	DATE	DESCRIPTION

DESIGNED JLG
DRAWN DVN
CHECKED JLG
SCALE N/A

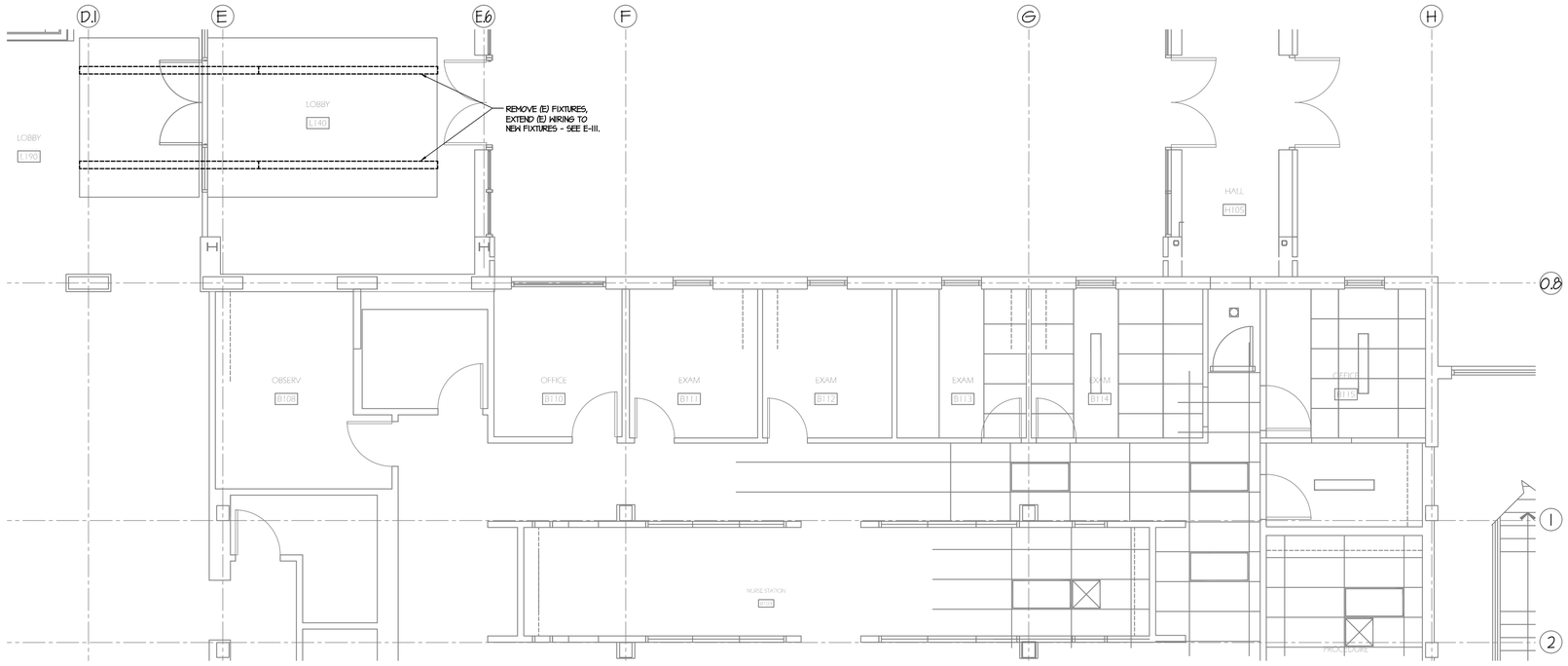
DATE 13FEB2012
PROJECT K010.06

E-001

SHT 22 OF 28

DEMOLITION NOTES:

1. SIZE AND LOCATION OF ALL EXISTING ELECTRICAL EQUIPMENT IS APPROXIMATE. CONTRACTOR SHALL SITE VERIFY THE EXACT LOCATION OF EXISTING AND CONSTRUCT ALL WORK FROM FIELD DIMENSIONS. CONTRACTOR SHALL MAKE ADJUSTMENTS NECESSARY TO ACCOMMODATE MINOR DEVIATIONS AT NO COST TO OWNER.
2. LIGHT LINE WORK INDICATES EXISTING ELECTRICAL CIRCUITRY AND OTHER ELECTRICAL EQUIPMENT. DASHED LINE WORK INDICATES ELECTRICAL DEVICES AND EQUIPMENT TO BE REMOVED.
3. WHERE EXISTING EQUIPMENT IS REMOVED AND NOT REPLACED IN THE SAME LOCATION, PATCH AND PAINT SURFACES TO MATCH ORIGINAL CONDITION.
4. REMOVE ALL ABANDONED RACEWAY AND WIRING.
5. RECONNECT ALL CIRCUITRY TO REMAINING DEVICES AND EQUIPMENT.
6. PROVIDE BLANK FACE PLATES FOR ALL SWITCHES BEING REMOVED.
7. WHERE ALL LOAD IS REMOVED FROM A BREAKER PROVIDE NEW TYPED PANEL SCHEDULE IDENTIFYING BREAKER AS "SPARE".



PARTIAL FIRST FLOOR DEMOLITION PLAN 1/E-101
SCALE: 1/4" = 1'-0"

NORTH

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REGISTERED PROFESSIONAL ENGINEER 11,350 OREGON JANUARY 25, 1991 JEFFREY L. GRAPER EXPIRES 06-30-13

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

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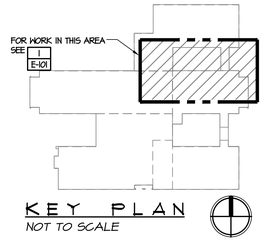

KEY PLAN
NOT TO SCALE

PARTIAL FIRST FLOOR DEMOLITION PLAN

MARK	DATE	DESCRIPTION

DESIGNED JLG
DRAWN DVN
CHECKED JLG
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

E-101
SHT 23 OF 28

O:\K010.06\Elec\E-101_DP1.dwg, PARTIAL FLOOR DEMOLITION PLANS, 2/10/2012 2:37:07 PM, dvn

SECOND FLOOR DEMOLITION PLAN

1 / E-102

SCALE: 1/8" = 1'-0"

NORTH

DEMOLITION NOTES:

1. SIZE AND LOCATION OF ALL EXISTING ELECTRICAL EQUIPMENT IS APPROXIMATE. CONTRACTOR SHALL SITE VERIFY THE EXACT LOCATION OF EXISTING AND CONSTRUCT ALL WORK FROM FIELD DIMENSIONS. CONTRACTOR SHALL MAKE ADJUSTMENTS NECESSARY TO ACCOMMODATE MINOR DEVIATIONS AT NO COST TO OWNER.
2. LIGHT LINE WORK INDICATES EXISTING ELECTRICAL CIRCUITRY AND OTHER ELECTRICAL EQUIPMENT. DASHED LINE WORK INDICATES ELECTRICAL DEVICES AND EQUIPMENT TO BE REMOVED.
3. WHERE EXISTING EQUIPMENT IS REMOVED AND NOT REPLACED IN THE SAME LOCATION, PATCH AND PAINT SURFACES TO MATCH ORIGINAL CONDITION.
4. REMOVE ALL ABANDONED RACEWAY AND WIRING.
5. RECONNECT ALL CIRCUITRY TO REMAINING DEVICES AND EQUIPMENT.
6. PROVIDE BLANK FACE PLATES FOR ALL SWITCHES BEING REMOVED.

REFERENCE NOTES:

1. REMOVE (E) CONDUCTORS. REUSE RACEWAY FOR NEW EQUIPMENT.
2. (E) PANELS TO REMAIN.

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REGISTERED PROFESSIONAL ENGINEER 11,350 OREGON SEPT. 25, 1981 JEFFREY L. GRAPER EXPIRES 06-30-13

[illegible]

HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
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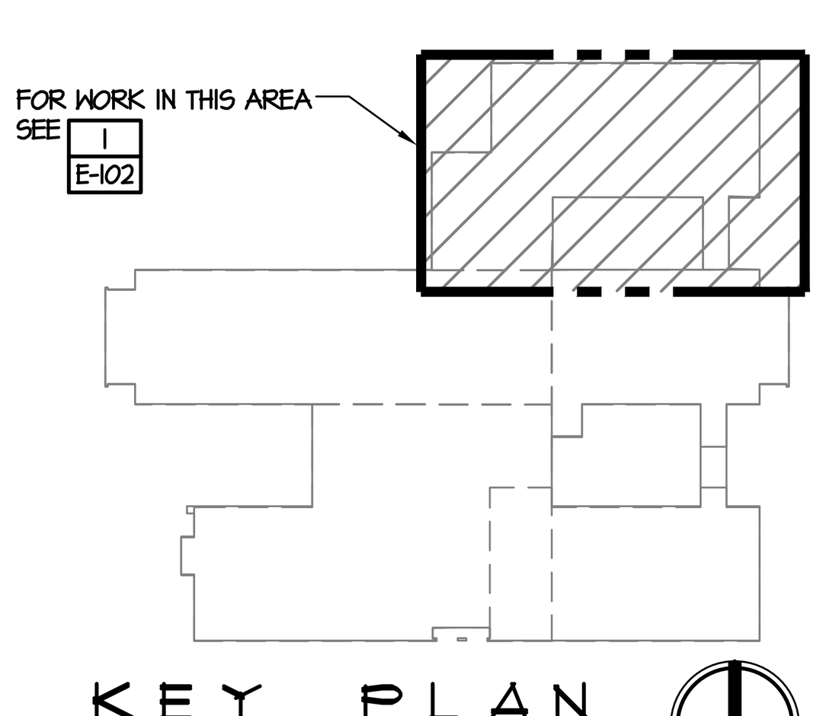
OWNER:
UNIVERSITY of OREGON

SECOND FLOOR DEMOLITION PLAN

MARK	DATE	DESCRIPTION

DESIGNED JLG
DRAWN DVN
CHECKED JLG
SCALE AS SHOWN

DATE 13FEB2012
PROJECT K010.06



KEY PLAN
NOT TO SCALE

E-102

SHT 24 OF 28

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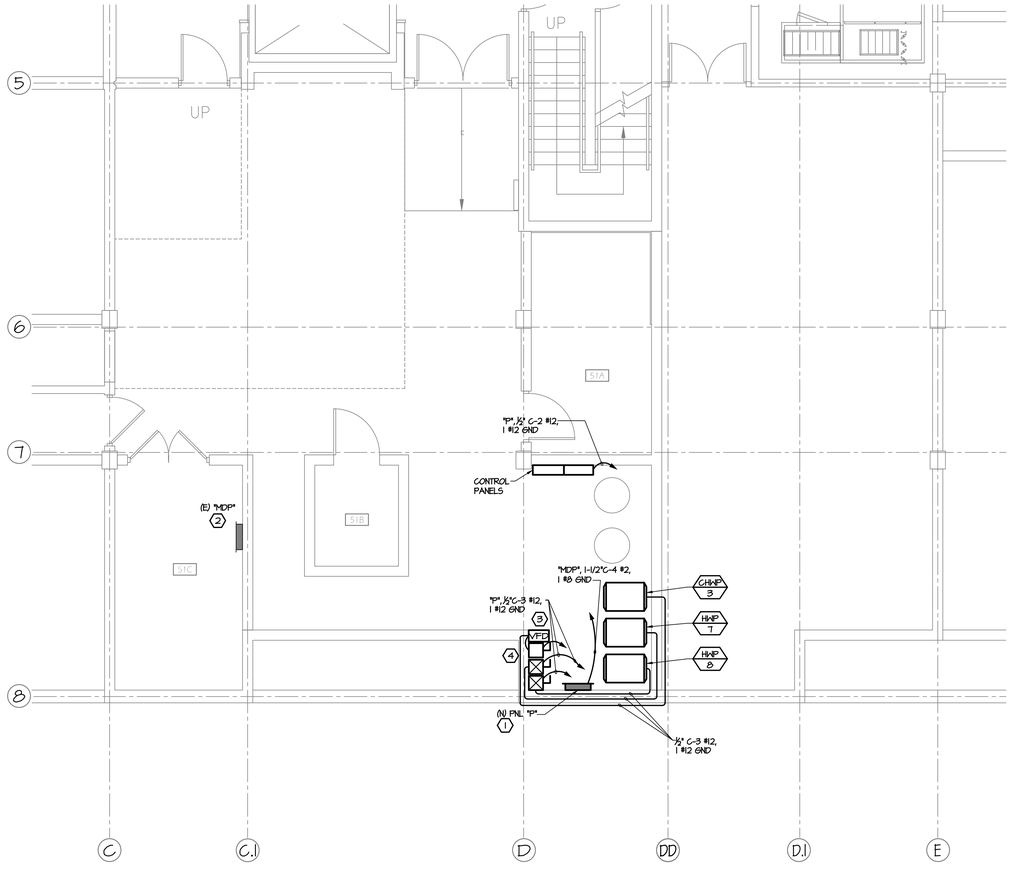
REFERENCE NOTES:

1. PROVIDE NEW PANEL - SEE SCHEDULE.
2. CONNECT NEW PANEL "P" TO (E) 100/3 IN MDP.
3. VFD PROVIDED BY MECH. FOR EXACT LOCATION, COORDINATE WITH MECH.
4. VFD CABLE - SEE SPECIFICATIONS.



BASEMENT POWER PLAN 1 / E-110
SCALE: 1/4" = 1'-0"

NORTH

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HVAC SYSTEM REPLACEMENT

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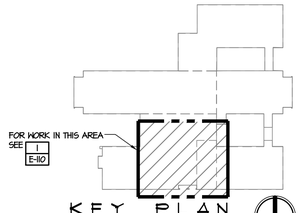


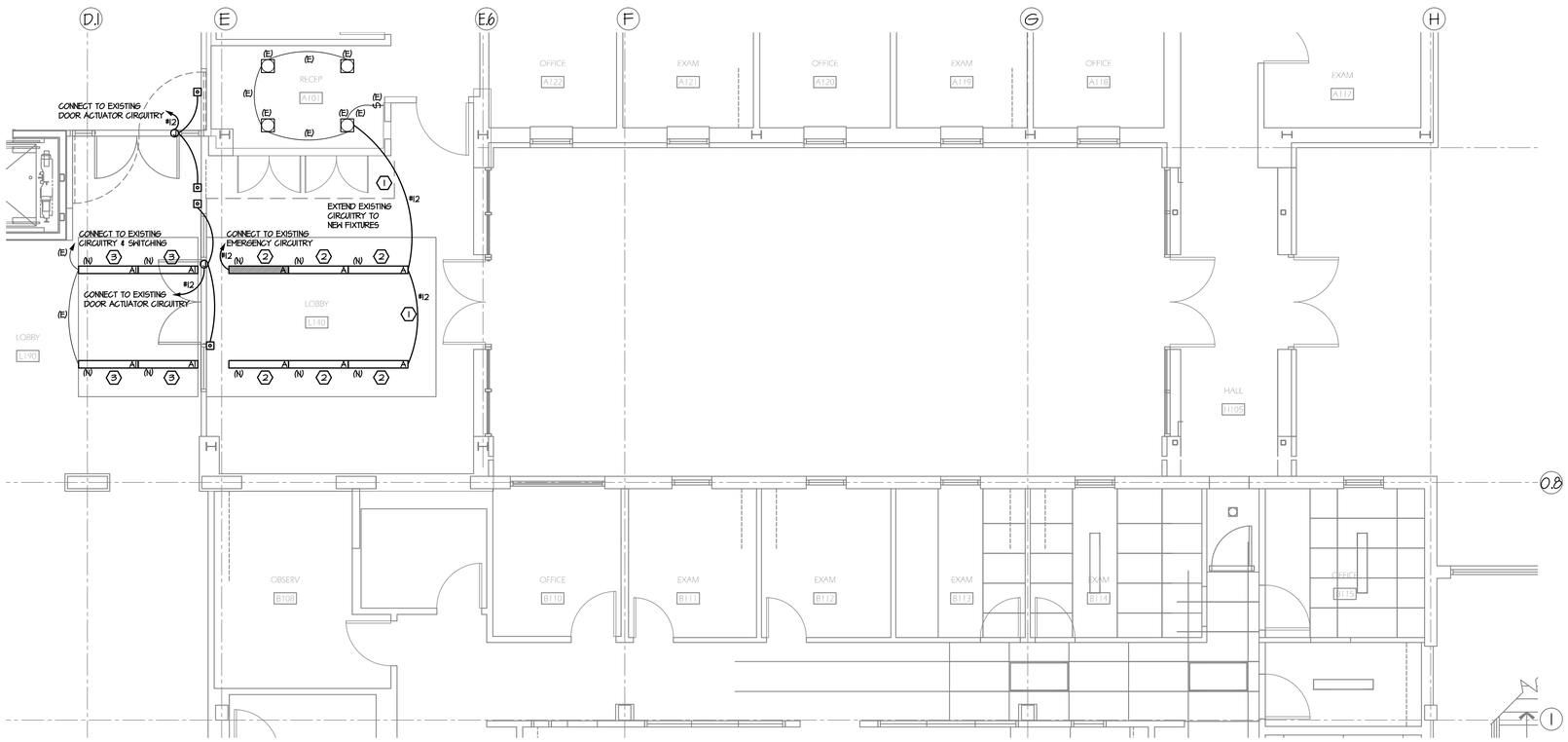
KEY PLAN
NOT TO SCALE

BASEMENT POWER PLAN

MARK	DATE	DESCRIPTION

DESIGNED JLG
DRAWN DVN
CHECKED JLG
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

E-110
SHT 25 OF 28



PARTIAL FIRST FLOOR LIGHTING AND POWER PLAN

1 / E-111

SCALE: 1/4" = 1'-0"

REFERENCE NOTES:

1. EXTEND NEW WIRING TO CONNECT TO EXISTING CIRCUITRY.
2. NEW RECESSED LIGHT FIXTURES EXTEND EXISTING CIRCUITRY.
3. NEW SUSPENDED LIGHT FIXTURES EXTEND EXISTING CIRCUITRY.

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HVAC SYSTEM REPLACEMENT

UNIVERSITY HEALTH & COUNSELING CENTER

LOCATION:
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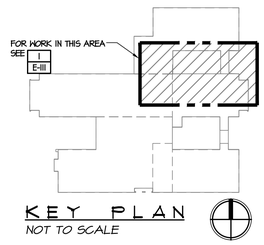
EUGENE, OREGON

OWNER:
UNIVERSITY of OREGON



KEY PLAN
NOT TO SCALE

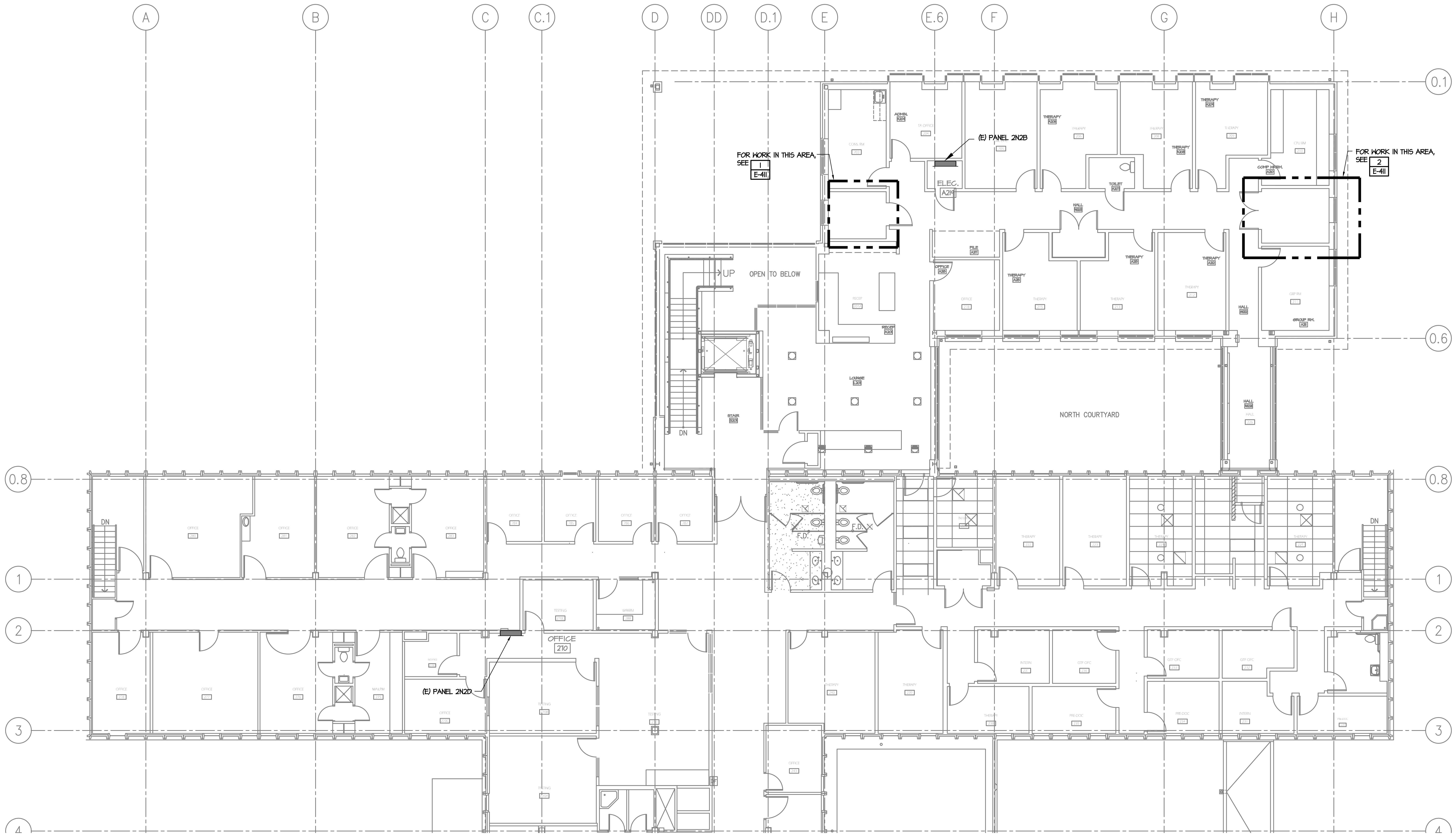
PARTIAL FIRST FLOOR LIGHTING AND POWER PLAN

MARK DATE DESCRIPTION

DESIGNED JLG
DRAWN DVN
CHECKED JLG
SCALE AS SHOWN
DATE 13FEB2012
PROJECT K010.06

E-111

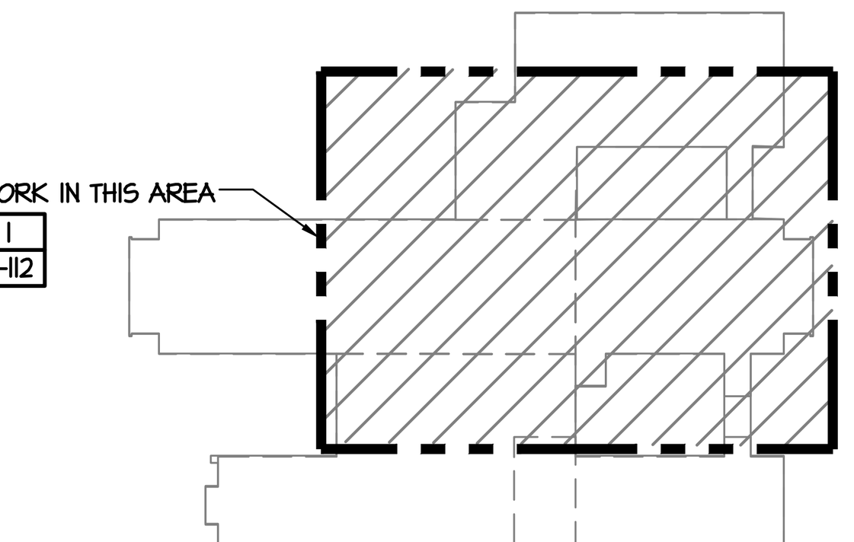
SHT 26 OF 28



SECOND FLOOR POWER PLAN 1 E-112

SCALE: 1/8" = 1'-0"

NORTH



KEY PLAN

NOT TO SCALE

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REGISTERED PROFESSIONAL ENGINEER
11,350
OREGON
SEPT. 25, 1984
JEFFREY L. GRAPER
EXPIRES 06-30-13

[illegible]

HVAC SYSTEM
REPLACEMENT

UNIVERSITY
HEALTH &
COUNSELING
CENTER

LOCATION:
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EUGENE, OREGON

OWNER:
UNIVERSITY of
OREGON

SECOND FLOOR
POWER PLAN

MARK	DATE	DESCRIPTION

DESIGNED JLG
DRAWN DVN
CHECKED JLG
SCALE AS SHOWN

DATE 13FEB2012
PROJECT K010.06

E-112

SHT 27 OF 28

REFERENCE NOTES:

1. VFD PROVIDED BY MECH. FOR EXACT LOCATION, COORDINATE WITH MECH.
2. EXTEND RACEWAY TO NEW UNIT. PROVIDE NEW CONDUCTORS AND CONNECT.
3. STARTER-SEE MECH.
4. VFD CABLE - SEE SPECIFICATIONS.

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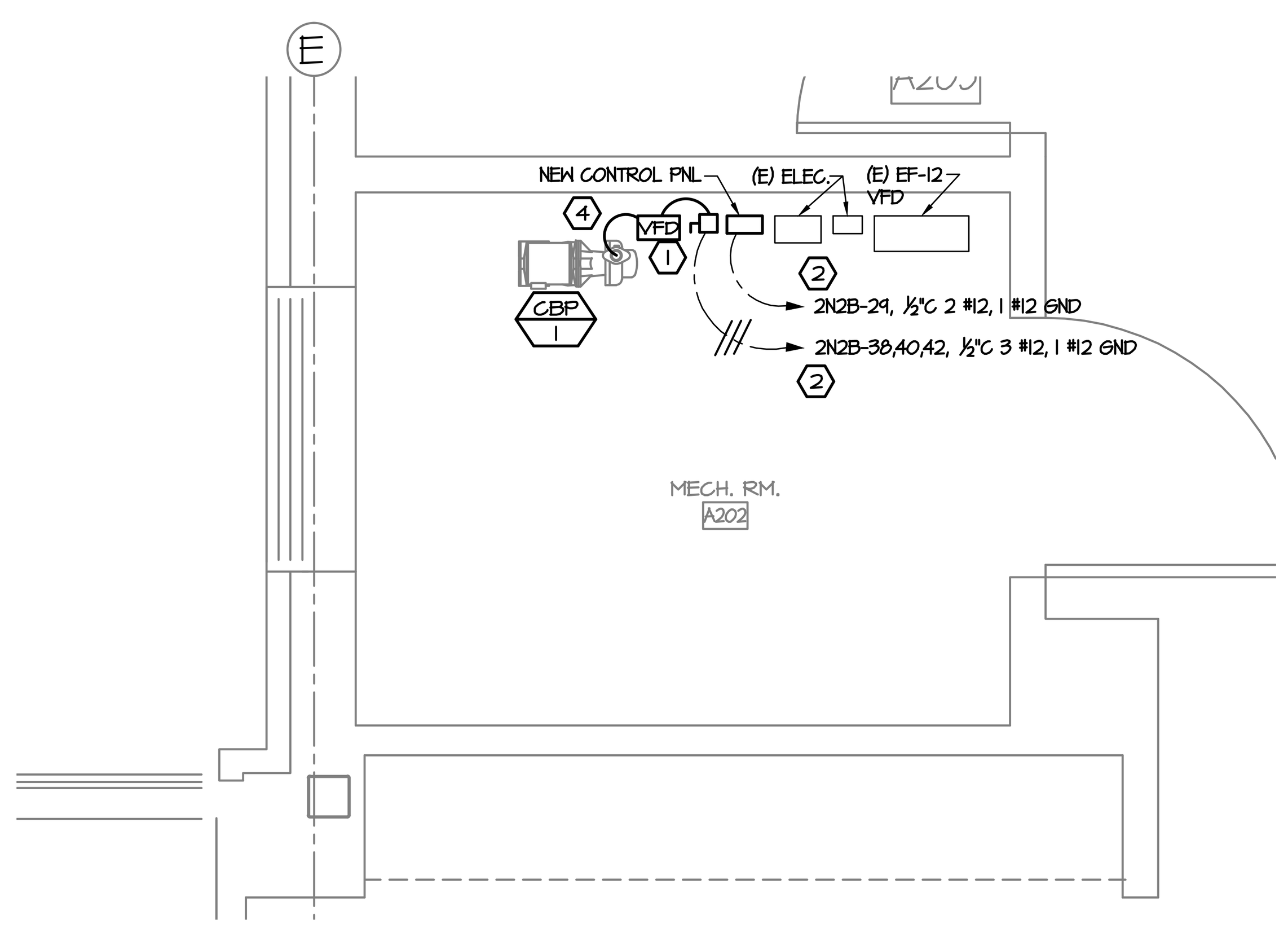
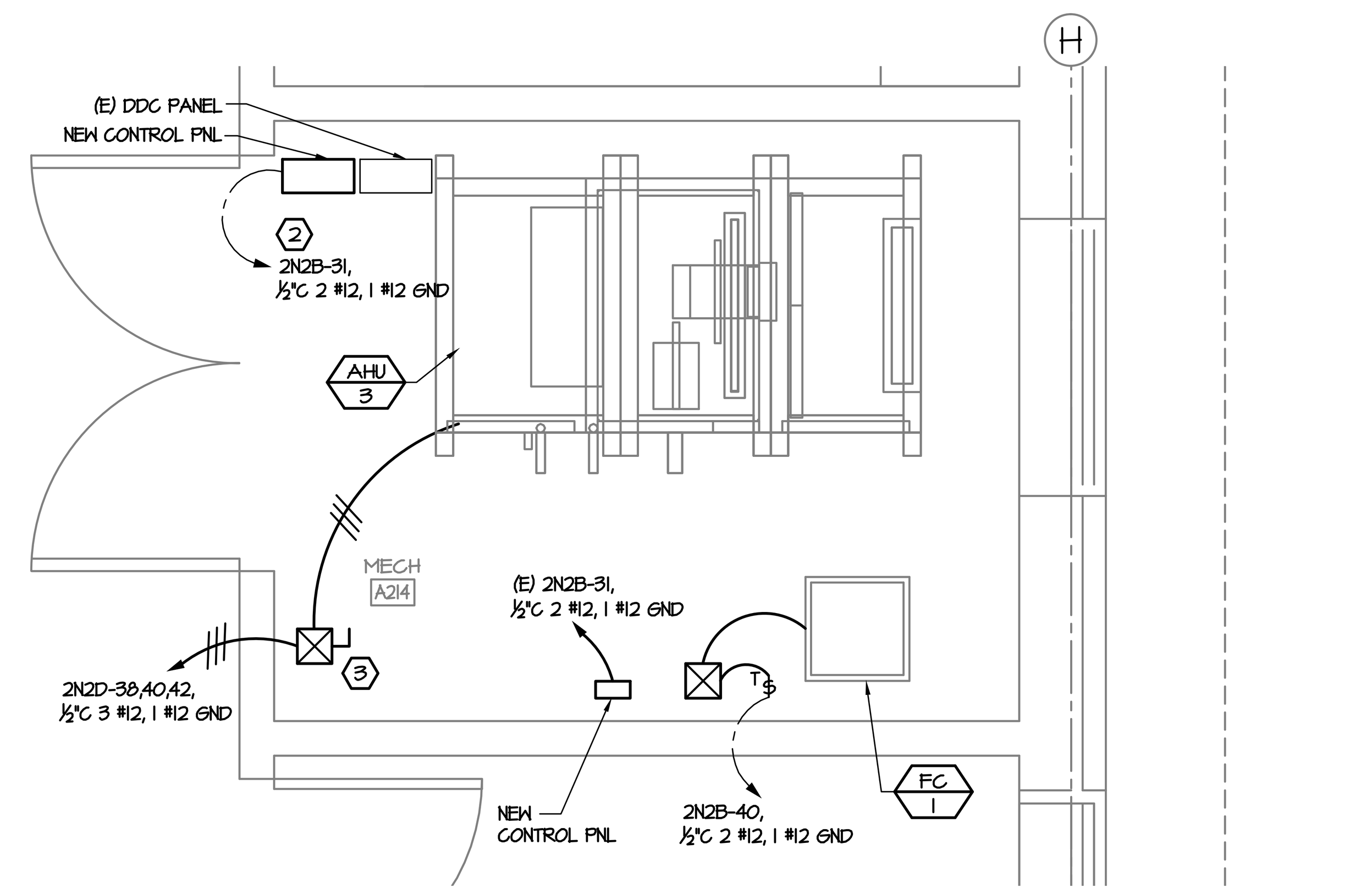
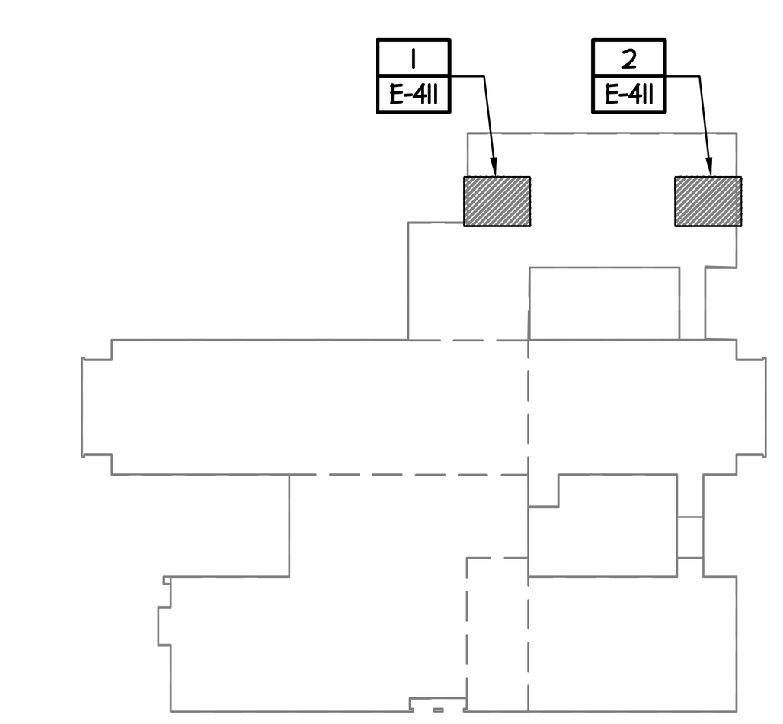


ENLARGED - POWER ROOM 2Ø2
SCALE: 1/2" = 1'-0"
1 E-411
NORTH



ENLARGED - POWER ROOM 214
SCALE: 1/2" = 1'-0"
2 E-411
NORTH



KEY PLAN
NOT TO SCALE

ENLARGED POWER ELECTRICAL PLANS

MARK	DATE	DESCRIPTION

DESIGNED JLG
DRAWN DVN
CHECKED JLG
SCALE AS SHOWN

DATE 13FEB2012
PROJECT K010.06

E-411

SHT 28 OF 28