



JANUARY 23, 2026

Project Manual

Eastern Oregon University

West Steam Distribution Main Replacement

100% Construction Documents

Y006.03

EOU Project Number FP-2022-03

725 A Street Springfield, OR 97477

550 NW Franklin Blvd., Suite 448, Bend, OR 97703



SystemsWestEngineers.com

(541) 342-7210

PROJECT MANUAL

Y006.03

EASTERN OREGON UNIVERSITY

West Steam Distribution Main Replacement

EOU Project Number FP-2022-03

100% Construction Documents

January 23, 2026

Owner:
Eastern Oregon University
Facilities & Planning
One University Blvd.
La Grande, Oregon 97850
Phone: (541) 962-3114
Cell: (541) 805-0807
Contact: John Garlitz, P.E.
Director of Facilities and Planning
jgarlitz@eou.edu

Mechanical & Electrical Engineer:
Systems West Engineers, Inc.
725 A Street
Springfield, Oregon 97477
Phone: (541) 342-7210
Contact: Nathan J Jenkins, PE
Project Manager
njenkins@systemswestengineers.com



INVITATION TO BID PROPOSALS # FP-2022-03

WEST STEAM DISTRIBUTION MAIN REPLACEMENT

ISSUE DATE: JANUARY 27, 2026

MANDATORY MEETING & SITE VISIT:

Tuesday, February 10, 2026 at 10:00 AM
Main Entrance of the Physical Plant Administration Building
One University Blvd, La Grande, OR 97850

BID DUE DATE & TIME

Thursday, February 19, 2026 at 2:00 PM
via sealed bid submission to
bids@eou.edu

REQUEST FOR CLARIFICATIONS OR CHANGE OR PROTEST BID DOCUMENTS:

Must be received in writing by February 13, 2026, 5:00 PM

PROJECT NUMBER FP-2022-03

Eastern Oregon University is seeking Bid Proposals for the Project described below pursuant to this INVITATION TO BID. By submitting a Bid, the Bidder represents that they have carefully read the terms and conditions of this Bid Proposal, including all attachments and addenda, and agrees to be bound by them.

Contract Administrator

John Garlitz, Director of Facilities & Planning
EOU Facilities & Planning Department
Phone: (541) 962-3114
Email: jgarlitz@eou.edu

Bid Proposal Administrator

Lowann Vanleuven, F&P Business Manager
EOU Facilities & Planning Department
Phone: (541) 962-3181
Email: bids@eou.edu

It is the Bidder's responsibility to continue to monitor the ORPU.org website for Addenda. Failure to acknowledge any Addenda in the Transmittal Letter may cause your Bid to be considered non-responsive.

[EOU Policy 3.15.01 – Procurement and Contracting of Goods and Services](#) govern this solicitation unless otherwise referenced in this or stated.

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00 20 00	INSTRUCTION TO BIDDERS
00 30 00	AVAILABLE INFORMATION
00 40 00	PROCUREMENT FORMS
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00 70 00	EOU GENERAL CONDITIONS FOR PIC

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01 30 00	ADMINISTRATIVE REQUIREMENTS
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01 56 39	TREE AND PLANT PROTECTION
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01 70 00	CONTRACT CLOSEOUT
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02 41 00	DEMOLITION AND SALVAGE

DIVISION 22 – PLUMBING

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22 05 14	COMMON MOTOR CONTROL REQUIREMENTS FOR PLUMBING EQUIPMENT
22 05 17	SLEEVES, SLEEVE SEALS, AND ESCUTCHEONS FOR PLUMBING PIPING
22 05 23	VALVES FOR PLUMBING PIPING
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23 05 17	SLEEVES, SLEEVE SEALS, AND ESCUTCHEONS FOR HVAC PIPING
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23 05 23	VALVES FOR HVAC PIPING
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CERTIFICATION BY MECHANICAL ENGINEER

CERTIFICATION

I hereby certify that the plans and the Contract Documents were prepared by me or under my direct supervision and that I am duly registered under the laws of the State of Oregon

Professional
Engineer's
License No. OR 95772PE

Signed



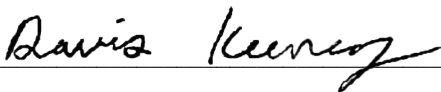
Date: 2026.01.23

CERTIFICATION BY CIVIL ENGINEER

CERTIFICATION

I hereby certify that the plans and the Contract Documents were prepared by me or under my direct supervision and that I am duly registered under the laws of the State of Oregon

Professional
Engineer's
License No. OR 103606

Signed 

Date: 2026.01.23

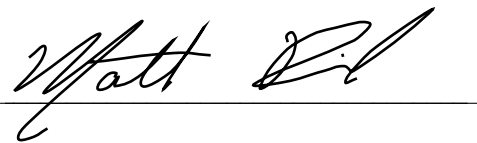
CERTIFICATION BY ELECTRICAL ENGINEER

CERTIFICATION

I hereby certify that the plans and the Contract Documents were prepared by me or under my direct supervision and that I am duly registered under the laws of the State of Oregon

Professional
Engineer's
License No. OR 80,621

Signed

A handwritten signature in black ink, appearing to read "Matt D.", is written over a horizontal line.

Date: 2026.01.23

INVITATION FOR BIDS

Owner: Eastern Oregon University, La Grande, OR

Project: EOU West Steam Distribution Main Replacement

Bidders must submit Bids electronically. Hard copies will not be accepted. Bids must be delivered through email in a searchable PDF format to, bids@eou.edu and must be received by **2:00 PM, Thursday February 19, 2026**, at which time bids shall be immediately opened; however, the amounts of the Bids will not be publicly provided at that time. The email subject line must include the title: “**Bid Proposal: West Steam Distribution Main Replacement**”. Within two working hours after the date and time designated for Bid opening, the Bidder shall submit to EOU the First Tier Subcontractors Disclosure Form through email in a searchable PDF format to bids@eou.edu. The email subject line must include the title “**1st Tier Subcontractor Form: West Steam Distribution Main Replacement**”. If a First Tier Subcontractors Disclosure Form is not received by **4:00 PM** the Bid will be considered Non-Responsive. After the deadline for submitting the First Tier Subcontractors Disclosure Form, the responsive Bid amounts will be reviewed and publicly posted in a timely manner.

Bids shall be clearly marked “**West Steam Distribution Main Replacement**”, showing the date and time of the bid is due, and shall be delivered via email to bids@eou.edu on or before the above bid time. No faxed bids will be considered.

A **Mandatory Pre-Bid Conference** will be convened Tuesday, February 10, 2026 at 10:00 AM at Main Entrance of the Physical Plant Administration Building, One University Blvd, La Grande, OR 97850.

Written requests for clarification or change or protests of the Bid Documents (defined below), including but not limited to the form of contract, must be received by February 13, 2026 at 5:00 PM.

- Should a Bidder find discrepancies in, or omissions from the Bid Documents, or should the Bidder be in doubt as to their meaning or believe that any aspect of the Bid Documents is improvident or unlawful or which may unnecessarily restrict competition, the Bidder should at once notify EOU in the form of a request for clarification, change, or protest. Only responses issued by formal written Addenda will be binding.
- The purpose of this request for clarification, change or protest procedure is to permit EOU time to correct, prior to the submission of Bids, aspects of the Bid Documents that may be improvident or unlawful, or which may unnecessarily restrict competition. This requirement is intended to eliminate, by permitting corrections prior to the submission of Bids, the waste of resources and delay that may result from the untimely detection of errors in the Bid Documents, possible protests, and possible rejection of Bids.
- EOU will consider each request for clarification, change, or protest and amend the Bid Documents accordingly if warranted and notify by written Addenda each prospective Bidder of any change. No other explanation or interpretation will be considered official or binding. Oral and other interpretations or clarification will be without legal effect.
- Any prospective Bidder who contends that the terms and conditions of the Bid Documents, including but not limited to the Contract, or any aspect of the selection process: (i) will encourage favoritism in the award of the Contract; (ii) will substantially diminish competition; (iii) will violate any other statute, regulation, policy, or law of any kind, including but not limited to EOU Policy 3.15.01 – Procurement and Contracting of Goods and Services; and/or (iv) are ambiguous, insufficient, or unfair for any reason must file a written protest.

- Protests must set forth the basis of the protest or request for clarification along with any proposed changes to the Bid Documents, including but not limited to the specifications or Contract terms. Failure to file a protest by the time and date indicated above will be deemed a waiver of any claim by a Bidder that the selection process violates any of the items (i)-(iv) in Paragraph 6.5. Any protest that does not meet these requirements will not be considered.
- EOU will issue a written disposition of each such request for change or clarification and/or protest no less than three business days before Bids are due. If EOU agrees with the request or upholds the protest, in whole or in part, EOU may, in its sole discretion, issue an Addendum reflecting its disposition or take other appropriate action.
- Addenda may also be issued to modify the Bid Documents or Contract Documents as deemed advisable by EOU. EOU will post addenda, if any, on its website. It is each Bidder's responsibility to check the website frequently for updates and addenda.

Work will include: selective site steam system demolition, site trenching and backfill, and new distribution piping and vaults. Work includes selective improvements to the basement and tunnel under Quinn Coliseum, including demolition of unused piping and sewage ejector pump replacement.

Bid Procedures and Conditions, Bid Forms, Drawings, Specifications, and other Documents collectively referred to as the Bid Documents may be examined at the www.ORPU.org website. These are uncontrolled documents, and it is the sole responsibility of bidder to continue to monitor the www.ORPU.org website for Addenda. Failure to acknowledge any Addenda will be cause for being considered non-responsive.

[EOU Policy 3.15.01 – Procurement and Contracting for Goods and Services](#) govern this bid solicitation unless otherwise referenced or stated.

Each Bid must contain a statement as to whether the bidder is a resident bidder, as defined in ORS 279A.120. In determining the lowest qualified bidder, the Eastern Oregon University will, for the purpose of awarding the Contract, include a contractor proposed Bid Price, and add a percentage increase on the Bid of a nonresident bidder equal to the percentage, if any, of the preference given to that bidder in the state in which the bidder resides.

The successful Bidder will be required to furnish separate Performance and Payment Bonds submitted on the prescribed forms for faithful performance of the Contract in the full amount of the Contract price. The Surety issuing the bond must hold a certificate of authority to transact surety business in Oregon.

The Eastern Oregon University reserves the right to reject any or all Bids for good cause, or any or all Bids upon a finding of the Owner that it is in the public interest to do so, to postpone the award of the Contract for a period not to exceed thirty (30) days, and to accept that Bid which is to the best interests of the Eastern Oregon University

For information regarding this project, contact the John Garlitz, Director of Facilities and Planning, Eastern Oregon University Facilities & Planning Department, phone (541) 962-3114, email jgarlitz@eou.edu.

END OF SECTION

INSTRUCTIONS FOR BIDDERS

1. Project Data & Information

- 1.1. Project: West Steam Distribution Main Replacement
- 1.2. Project Location: La Grande, OR
- 1.3. Project Owner: Eastern Oregon University
- 1.4. Project Funding: EOU CIR XI-Q Bond Funds
- 1.5. Project Starting and Completion Times:

Work is to commence within 7 days of the date of Notice to Proceed which is anticipated being on or before **Monday, March 9, 2026**, and shall be substantially completed by **Friday, September 11, 2026**

- 1.6. Liquidated Damages:

Liquidated damages shall apply against the Contractor and accrue to the Owner at the rate of **\$2,000** per day for each and every calendar day afterwards that the project remains uncompleted beyond the time limit set. Refer to Article II.B of the Section 00 50 00 – Public Improvement Contract.

- 1.7. Bid Schedule:

The work is offered in one Bid schedule on a unit price basis, and proposed Contract Time basis. Each item is to be Bid and filled out. If a Bid item is not filled in, including the proposed Contract Time, the Bid may be considered non-responsive. No substitutions, alternate bids or partial bids are allowed, except as provided by written addenda from the Owner.

- 1.8. Owner's A/E Consultant:

Systems West Engineers, 725 A Street, Springfield, OR 97477

- 1.9. Retainage:

To ensure proper performance of this Contract, the Owner shall retain five percent (5%) of the amount of each progress payment until completion and acceptance of all work covered by this Contract.

- 1.10. Prevailing Wages:

This Contract is subject to prevailing wages under the State of Oregon statutes. Refer to Article X.B of the Section 00 50 00 – Public Improvement Contract.

- 1.11. Performance and Payment Bonds:

Prior to execution of the Contract, the Bidder shall furnish separate bonds covering the faithful performance of the Contract, and the payment of all obligations arising thereunder, each in an amount equal to one hundred percent (100%) of the Contract sum. The cost of furnishing such bonds shall be included in the Bid. The surety issuing such bonds shall be licensed to issue bonds in the State of Oregon

2. Responsibility of Bidders

- 2.1. Bidder shall include all information in the Responsibility Inquiry Form in Section 00 40 00 – Bid Forms as part of the sealed bids.
- 2.2. Before submitting a bid, it is the responsibility of each bidder to:
 - 2.2.1. Examine and carefully study the Solicitation Documents including but not limited to the drawings and specifications before submitting a bid.

- 2.2.2. Quantities appearing in the Bid Schedule are approximate and are provided for only the comparison of Bids. The Owner does not warrant that the actual individual items, amount of Work, or quantities will correspond to those shown in the Bid Schedule. Payment to Contractor will be made for actual quantities of Work performed and accepted or Materials furnished and accepted, as required by the Contract. Quantities of the Work to be performed and Materials to be furnished may be increased, decreased, or omitted by the Owner. The Owner reserves the right to require changes it deems necessary or desirable within the Specifications means the general scope of the project.
- 2.2.3. Visit the site to (i) become familiar with and satisfy the Bidder as to the general, local site conditions that may affect cost, progress, performance or furnishing of the Work including but not limited to access, topography, weather and the kind and quality of materials to be encountered in excavation and (ii) perform such examination, investigation, explorations, tests, and studies necessary for the determination of its Bid for performance of the Work required at the prices bid and within the times committed to, and in accordance with the other terms and conditions of the Solicitation Documents. Each Bidder shall be conclusively presumed to have knowledge of the general, local and site conditions in the preparation of the Bid and in the execution of the Contract. Bidders should be aware that participation in the pre-Bid visit is non-mandatory.
- 2.2.4. Consider all federal, state, and local laws and regulations that may affect costs, progress, performance or furnishings of the Work, including but not limited to those laws and regulations in the numbered Sections and Exhibits referenced or contained in Solicitation Documents.
- 2.2.5. Consider the information known to the Bidder; information commonly known to contractors performing similar work, information and observations obtained from visits to the work sites; the Solicitation Documents, with respect to the effect of such information, observations and documents on (i) the cost, progress and performance of the Work; (ii) the means, methods, techniques, sequences and procedures for completing the Work; (iii) Bidder's safety precautions and programs
- 2.2.6. Become aware of the general nature of the operations of the general public, EOU and/or other contractors at various locations that maybe related to the Work required for the completion of the Project.
- 2.2.7. Promptly notify EOU of all conflicts, errors, ambiguities, or discrepancies in or between the Bid Documents, Invitation to Bid (ITB), or all related documents contained in the Solicitation Documents.
- 2.2.8. When conflicts, errors, ambiguities, or discrepancies are discovered in or between the Bid Documents, ITB, and any other related documents, and when such conflicts have not been resolved through the interpretations of EOU in Section 3, Bidder shall include in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in the greater cost. Such greater cost shall be included in the Bid.
- 2.2.9. The submission of a bid will constitute an incontrovertible representation by Bidder (i) that Bidder has complied with every requirement of this Section 2, (ii) that without exception the Bid is premised upon performing and furnishing the design and Work required by the Solicitation Documents for this Project, and applying the specific means, methods, techniques, sequences, or procedures for the completion of the Work that may be shown, indicated, or expressly required in the Solicitation Documents, (iii) that Bidder has given EOU written notice of all conflicts, errors, ambiguities and discrepancies in the Solicitation Documents and the written resolution thereof by EOU are acceptable

to Bidder, and when said conflicts, etc., have not been resolved through the interpretations as described in Section 3, Bidder has included in the Bid the greater quantity or better quality of Work, or compliance with a most stringent requirement resulting in a greater cost, and (iv) that the Solicitation Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

3. Request for Clarifications or Change, Solicitation Protests

- 3.1. Bidders desiring to submit a request for clarification, change or protest must make a request for such information in writing to EOU no later than **5:00 PM, February 13, 2026**.
- 3.2. Should a Bidder find discrepancies in, or omissions from the Solicitation Documents, or should the Bidder be in doubt as to their meaning or believes that any aspect of the Solicitation Documents is improvident or unlawful, or which may unnecessarily restrict competition, the Bidder should at once notify the EOU in the form of a request for clarification, change or protest. Only responses issued by formal written Addenda will be binding.
- 3.3. The purpose of this request for clarification, change or protest procedure is to permit EOU the time to correct, prior to submission of Bids, aspects of the Solicitation Documents that may be improvident or unlawful, or which may unnecessarily restrict competition. This requirement is intended to eliminate, by permitting corrections prior to the submissions of Bids, the waste of resources and delays that may result from the untimely detection of errors in the Solicitation Documents, possible protests, and possible rejection of Bids.
- 3.4. EOU will consider each request for clarification, change, or protest and amend the Solicitation Documents accordingly if warranted and notify by written Addenda each prospective Bidder of any change. No other explanation or interpretation will be considered official or binding. Oral and other interpretations or clarifications will be without legal effect.
- 3.5. Any prospective Bidder who contends that the terms and conditions of the Solicitation Documents, including but not limited to the Contract, or any aspect of the solicitation process: (i) will encourage favoritism in the award of the Contract; (ii) will substantially diminish competition; (iii) will violate any other statute, regulation, policy, or law of any kind; and/or (iv) are ambiguous, insufficient, or unfair for any reason must file a written protest consistent with the procedures provided in EOU Policy 3.15.01.
- 3.6. Protests must set forth the basis of the protest or request for clarification along with any proposed changes to the Solicitation Documents, including but not limited to the specifications or Contract terms. Failure to file a protest by the date and time indicated will be deemed a waiver of any claim by a Bidder that the selection process violates any of these items in Section 3. Any protest that does not meet these requirements will not be considered.
- 3.7. EOU will issue a written disposition of each such request for change, clarification, and/or protest no less than three (3) business days before the Bids are due. If EOU agrees with the request or upholds the protest, in whole or in part, EOU may, in its sole discretion, issue an Addendum reflecting its disposition or take other appropriate action.
- 3.8. Addenda may also be issued to modify the Solicitation Documents or Contract Documents as deemed advisable by EOU. EOU will post addenda, if any, on the ORPU.org website. It is each Bidder's responsibility to check that website frequently for updates and addenda.

4. Bid Security

- 4.1. Each Bid must be accompanied by a Bid security made payable to EOU in an amount of ten percent (10%) of Bidder's maximum Bid price and in the form of a cashiers check or certified check; irrevocable letter of credit issued by an insured institution as defined in ORS 706.008; or a Bid Bond as provided in the Procurement Forms.
- 4.2. The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Intent to Award, whereon Bid security shall be returned. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security, certificates of insurance and bonds within 15 calendar days after the Notice of Intent to Award, EOU may consider Bidder to be in default and annul the Notice of Intent to Award, and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders who EOU believes to have a reasonable chance of receiving the award may be retained by EOU until the earlier of the seventh (7th) day after the Effective Date of the Contract after all Bids have been rejected, whereupon the Bid security furnished by such Bidder will be returned.

5. Basis Award.

After opening and reading of the Bids, EOU will check them for correct extension of unit prices and total. The total of extensions, corrected where necessary, will be used by EOU for Award purposes in determining the Successful Bidder. For the purposes of this Project "Successful Bidder" means the responsible bidder who submits the lowest responsive Bid, who is not on the list created by the Construction Contractors Board according to ORS Chapter 701.227. A responsible bidder is one who has, among other things:

- 5.1. Have available, the appropriate financial, materials, equipment, facility and personnel resources and expertise, or ability to obtain the resources and expertise, necessary to indicate the capability of the prospective Bidder to meet all contractual responsibilities.
- 5.2. A satisfactory record of performance. In evaluating a Bidder's record of performance, EOU may consider, among other things, whether the Bidder completed previous contracts of a similar nature with a satisfactory record of performance. For purposes of evaluating a Bidder's performance on previous contracts of a similar nature, a satisfactory record of performance means that to the extent that the costs associated with and time available to perform a previous contract remained within the Bidder's control, the Bidder stayed within the time and budget allotted for the procurement and otherwise performed the contract in a satisfactory manner. Satisfactory performance of the Contract also includes compliance with the requirements for records in the EOU General Conditions.
- 5.3. A satisfactory record of integrity. In evaluating a Bidder's record of integrity, EOU may consider, among other things, whether the Bidder has previous criminal convictions for offenses related to obtaining or attempting to obtain a contract or subcontract or in connection with the Bidder's performance of a contract or subcontract.
- 5.4. Qualified legally to contract with the EOU.
- 5.5. Supplied all necessary information in connection with the inquiry concerning responsibility. If a prospective Bidder fails to promptly supply information requested by the Agency concerning responsibility, the Agency will base the determination of responsibility upon any available information or may find the prospective Bidder not to be responsible.
- 5.6. Not been disqualified by the public contracting agency under ORS 279C.440.

- 5.7. An unexpired certificate issued by the Oregon Department of Administrative Services (under ORS 279A.167) upon completion of the curriculum and assessment that the Bidder understands the prohibitions set forth in ORS 652.220 and in other laws or rules that prohibit discrimination in compensation or wage payment. If the Bidder is found not to have a satisfactory record of performance or integrity, EOU will document the record and the reasons for the unsatisfactory finding.
- 5.8. In determining whether the Bidder is responsible, EOU may also consider whether the Bidder has liquidated and delinquent debt owed to the State of Oregon or any department or agency of the State, or any Public University in the State of Oregon. EOU may also investigate any entity submitting a bid, which may include investigation of the entity's officers, directors, owners, affiliates, or any other person acquiring ownership of the entity to determine the Bidder's qualifications.
- 5.9. EOU will provide Notice of Intent to Award on the www.ORPU.org website. The Award will not be final until the later of the following:
 - 5.9.1. Seven (7) calendar days after the Notice of Intent to Award has been posted as specified in the advertised solicitation or Addendum thereto; or
 - 5.9.2. EOU has provided a written response to each timely protest, denying the protest and affirming the Award.
- 5.10. If EOU accepts a Bid and awards a Contract, EOU will send the successful Bidder written notice of acceptance and Award.
- 5.11. EOU reserves the right, in its sole discretion:
 - 5.11.1. to reject Bids which it determines to be non-responsive;
 - 5.11.2. to reject Bids upon EOU's finding that the Bidder: (a) has been declared ineligible under ORS 279C.860; (b) has been identified by the Oregon Construction Contractor's Board as ineligible to hold public contracts in accordance with ORS 701.227; or (c) is not responsible;
 - 5.11.3. to reject all Bids;
 - 5.11.4. to amend the solicitation documents, including but not limited to making such changes or corrections in drawings, specifications, or quantities as it may deem necessary or desirable prior to the Bid due date;
 - 5.11.5. to extend the deadline for submitting Bids;
 - 5.11.6. to determine whether a Bid does or does not substantially comply with the requirements of the solicitation documents;
 - 5.11.7. to waive any minor irregularity, informality, or non-conformance with the solicitation documents;
 - 5.11.8. to obtain information from or provide information to other public agencies, upon request, regarding the Bidder's performance;
 - 5.11.9. to permit a Bidder to submit supplemental information;
 - 5.11.10. to negotiate with any Bidder or multiple Bidders as may be in the best interests of EOU;
 - 5.11.11. at any time prior to contract execution (including after the Notice of Intent to Award is issued): (a) reject any Bid that fails to substantially comply with all prescribed solicitation requirements and

procedures and/or the prescribed public contracting procedures and requirements, including but not limited to the requirement to demonstrate Bidder's responsibility; and/or (b) to reject all Bids received and cancel this solicitation upon a finding by EOU that there is good cause therefor and that such cancelation would be in the public interest;

- 5.11.12. to hold meetings, exchange correspondence, and obtain data from any source or party, including a Bidder; and
- 5.11.13. in the event any Bidder to whom the Contract is awarded shall fail to execute the Contractor or furnish satisfactory bonds or evidence of insurance coverage within the time and in the manner hereinafter specified, to re-award the Contract to another Bidder.

ALL BIDDERS WHO SUBMIT A RESPONSE TO THIS SOLICITATION UNDERSTAND AND AGREE THAT EOU IS NOT OBLIGATED TO AWARD A CONTRACT TO ANY BIDDER. EOU HAS NO FINANCIAL OBLIGATION TO ANY BIDDER. IN ADDITION, EACH BIDDER UNDERSTANDS AND AGREES THAT EOU SHALL NOT BE RESPONSIBLE FOR ANY DAMAGES, EXPENSES, AND COSTS INCURRED IN PREPARING A BID, SUBMITTING A BID IN RESPONSE TO THIS ITB, ATTENDING ANY MEETING, AND EXECUTING A CONTRACT. EACH BIDDER WHO PREPARES AND SUBMITS A BID IN RESPONSE TO THIS SOLICITATION DOES SO SOLELY AT THE BIDDER'S OWN COST AND EXPENSE.

END OF SECTION

AVAILABLE INFORMATION

Certain available information relating to the surface, subsurface, and structures is available to bidders, but is not directly part of the Contract Documents, are as follows:

1. Hazardous Containing Materials Report: Entitled *Limited Asbestos Containing Materials Inspection, Quinn Tunnels, Eastern Oregon University Campus*, dated June 20, 2022
 - a. A copy of this full fifty-on (51) page report is provided as Attachment 1 in the Procurement posting.
2. Piezometer Data: Entitled *Piezo Boring and Lab Results*
 - a. A copy of this five (5) page document is provided as Attachment 2 in the Procurement posting.
3. Water level information: xls Spreadsheet in PDF format Entitled *Downloaded Information from Data Loggers*.
 - a. A copy of this one hundred and twenty six (126) page document is provided as Attachment 3 in the Procurement posting.

This available information is provided as separate attachments based on their corresponding number above in PDF format at ORPU.org.

Any recommendations described in these documents shall not be construed as requirements of this Contract. These reports are provided for the Contractor's context and reference only. Should the Contractor require additional information beyond the Contract Documents, the Contractor shall arrange and pay for such testing to the extent necessary to complete their Work and is considered incidental to other bids items.

END OF SECTION

BIDDERS CHECKLIST

The Bidder's Attention is especially called to the following forms or information, which must be submitted in full as part of the bid.

- ☐ **BID** signed and completely filled out.
- ☐ **BID SCHEDULE** filled out showing bid amounts and properly signed.
- ☐ **BID BOND** completed, signed, and dated.
- ☐ **RESPONSIBILITY INQUIRY FORM** completed, signed, and dated.
- ☐ **CONTRACTOR'S REGISTRATION** completed, signed, and dated.

Above forms **MUST BE** inserted in a sealed envelope properly identified and delivered to the OWNER

- ☐ **Complete and submit, in a separate envelope, the FIRST-TIER SUBCONTRACTORS DISCLOSURE form. This form shall be submitted, timing as outlined in the instructions to bidders.**

(This Bidder's Checklist is provided as a convenience to the Bidder. It is recommended, but not required, that this page be attached to the front of the bid.)

BID

West Steam Distribution Main Replacement

**TO: BID West Steam Distribution Main Replacement
Eastern Oregon University
One University Blvd
La Grande, OR 97850**

Bidder's Declaration and Understanding

The undersigned Bidder declares that: (a) the Construction Drawings, Invitation to Bid, Information to Bidders, Bid, Bid Schedule and all other Bidding Requirements, including not limited to Addenda and other items uploaded to the ORPU.org website, collectively referred to hereinafter as the Contract Documents for the construction of the proposed improvement have been carefully examined; (b) that the site has been personally inspected and that he has determined the extent, character, and location of the proposed work, the nature and type of excavation to be done, the location and condition of the existing streets and roadways giving access to the site of the work, and the topography of the site of the work; (c) that the Bidder is satisfied as to the quantities of materials, items of equipment and conditions or work involved including the fact that the description of the quantities of work and materials as included herein is brief and is intended only to indicate the general nature of such items and to identify the said quantities with the detailed requirements of the Contract Documents; and (d) that the Bidder's Bid is made according to the provisions and under the terms therein, which documents are hereby made a part of this Bid.

The Bidder further declares that the only persons or parties interested in this Bid are those named herein; that this Bid is in all respects fair and without fraud; that it is made without collusion with any official of EOU (Owner), and that the Bid is made without any connection or collusion with any person making another Bid on this Contract.

The Bidder further declares by the signing of this Bid that all the provisions required by ORS 279 & 701 relating to the payment of prevailing wage rates for work performed under the Contract with the Owner shall be complied with. Including, but not limited to:

- a) Bidder is registered with the Oregon Construction Contractors Registration Board in Oregon in accordance with ORS 701.035 through 701.055. The Bidder certifies that Registration Number _____ (*fill in registration number*) allows their company to perform work on Public Works Projects and that this registration is current and valid. The Bidder further certifies that, if awarded the contract, all subcontractors performing the work will be registered with the Construction Contractors Board in accordance with ORS 701.055 before the subcontractors commence work under the contract (reference ORS 279C.365).
- b) Bidder agrees to be bound by and will comply with the provisions of prevailing wages in accordance with Article X.B and X.D and Section C of the EOU General Conditions.
- c) Bidder is in compliance with the State of Oregon tax laws in accordance with ORS 305.385.
- d) Bidder, in accordance with ORS 279A.110, does not discriminate against minorities, women, or emerging small business enterprises in obtaining any subcontracts (reference ORS 279A.110).
- e) Bidder is a [*Non-resident Bidder*] or [*Resident Bidder*] (circle correct designation) as defined in ORS 279A.120. Resident Bidder means a bidder that has paid unemployment taxes or income taxes in the State of Oregon during the 12 calendar months immediately preceding submission of the bid and has a business address in the State of Oregon per ORS 279C.365.

- f) Bidder and Bidder's subcontractors are not on the Oregon Construction Contractors Board list of corporations, partnerships, or other business entities of which the Contractor or subcontractor is an owner, shareholder, or officer of the business or was an owner or officer of the business and who have been determined not be qualified to hold or participate in a public contract for a public improvement.
- g) Bidder has an employee drug testing program that meets State and Federal standards per ORS 279C.505.

The Bidder further agrees that its own judgment has been exercised regarding the interpretation of subsurface information and all data which it believes pertinent from the Engineer, Owner, and other sources in arriving at these conclusions have been utilized.

Contract Execution and Bonds

The Bidder agrees that if this Bid is accepted, a Contract with the Owner, will be executed, within fourteen (14) calendar days after the date of the written Notice of Award, and will at that time, deliver to Owner the required Performance and Payment Bonds, and will, to the extent of this Bid, furnish all machinery, tools, apparatus and other means of construction and do the work and furnish all the materials necessary to complete all work as specified or shown in the Contract Documents.

Certificates of Insurance

The Bidder agrees to furnish the Owner, before commencing the work under this Contract, the certificates of insurance as specified in these Contract Documents.

Start of Construction and Contract Completion Date

The Bidder agrees to begin work within 7 calendar days after the date of the Notice to Proceed, which is anticipated to be on or before **Monday, March 9, 2026**, and shall be substantially completed by **September 11, 2026**

Liquidated Damages

In the event the Bidder is awarded the Contract and shall fail to complete the work within the time stated above or extended time agreed upon, as more particularly set forth in the Contract Documents, Bidder shall pay the Owner liquidated damages in an amount of **\$2,000** per day and every calendar day afterwards that the work remains uncompleted beyond the time limit set for all work awarded under the contract until the work shall have been finished as provided by the Article II.B of the Public Improvement Contract

Bid Bond

Accompanying this Bid is a certified check, cashier's check, or Bidder's bond in the sum of (10%) of the Bid Total which is forfeit as liquidated damages, if, in the event that this Bid is accepted, and the Bidder shall fail to execute the Contract and furnish satisfactory Performance Bond, Payment Bond, and insurance documents under the conditions and within the time specified in the Contract Documents. Otherwise, said check or bond is to be returned to the Bidder

Surety

If the Bidder is awarded a construction Contract on this Bid, the Surety who provides the Performance and Payment bond will be _____ whose address is _____

Lump Sum or Unit Price Work

The Bidder further proposes to accept as full payment for the work proposed herein the amounts computed under the provisions of the Contract Documents and based on the following lump sum or unit price amounts stated in the Bid

Schedule, it being expressly understood that the unit prices are independent of the exact quantities involved. The Bidder agrees that the lump sum prices and the unit prices represent a true measure of the labor and materials required to perform the work, including all allowances for overhead and profit for each type and unit of work called for in these Contract Documents.

Bidder

Bidder's Business Name:		
Type of Business: ☐ Sole Proprietorship ☐ Partnership ☐ Corporation (State of Incorporation: __) ☐ Other		
Physical Business Address (Must not be a P.O. Box):		
City:	State:	Zip Code:
Business Telephone Number:	Business Fax Number:	Business E-mail Address:
State of Oregon numbers for the following:		
Oregon CCB # & Expiration Date :	Oregon Registry # :	Federal Tax ID # :
In submitting this bid, it is understood that the Owner reserves the right to reject any and all bids, to adjust the scope of the work within reasonable limits, including to meet approved budget limitations, and to postpone award for a reasonable time.		

OFFICIAL AUTHORIZED TO SIGN FOR BIDDER:

"I certify (or declare) under penalty of perjury under the laws of the State of Oregon that the foregoing is true and correct":	
Signature:	Date:
Print Name and Title	Location or Place Executed: (City, State)

BID SCHEDULE

Item No.	Improvement	Estimated Quantity	Unit	Unit Cost (\$)	Total Cost (\$)
	Demolition/Site				
1	Mobilization	1	LS		
2	Erosion Control	1	LS		
3	Demolition	1	LS		
4	Contractor Potholing	4	EA		
5	Dewatering Mobilization, Installation, & Removal	1	LS		
6	Dewatering Per Day	25	DAY		
7	Demo/Backfill Existing Vault	3	EA		
8	Clearing and Grubbing	1	LS		
9	Asbestos Abatement	1	LS		
				<i>Subtotal</i>	
	Hardscape				
10	Snow Melt System Concrete Sidewalk (Match Existing Section)	483	SF		
11	Concrete Sidewalk (Match Existing Section)	876	SF		
12	Surface Restoration (Sod/Landscape)	1	LS		
				<i>Subtotal</i>	
	Civil Site				
13	Trenching/Backfill for Proposed Power Conduit	505	LF		
14	Trenching/Backfill/Pipe Zone for Proposed Piping (0'-10' depth)	957	LF		
15	Trenching/Backfill/Pipe Zone for Proposed Piping (10'-15' depth)	61	LF		
16	Excavation for Proposed Concrete Vault	3	EA		
17	Trench foundation	116	TON		

18	Concrete Saddle Block	3	EA		
19	Typical Utility Crossing	5	EA		
20	12"/18" Sewer Utility Crossing with Concrete Saddle Block	2	EA		
21	60" Mill Creek Utility Crossing with Concrete Saddle Block	1	EA		
22	687-WA Concrete Vaults	3	EA		
23	Concrete Anchor Blocks	8	EA		
24	Sump Pump/Storm Drain Piping	3	EA		
				<i>Subtotal</i>	
	Plumbing				
25	Sewage Ejector Pump and Controls	1	LS		
26	Sanitary and Vent Piping Connections to Existing	1	LS		
				<i>Subtotal</i>	
	Mechanical				
27	Direct Buried Steam Piping Conduit	1010	LF		
28	Direct Buried Condensate Piping Conduit	1010	LF		
29	Direct Buried Piping Leak Detection and Controls	2020	LF		
30	Steam/Condensate Piping and Appurtenances within Vaults and Tunnels	1	LS		
31	Quinn Basement Work	1	LS		
				<i>Subtotal</i>	
	Power				
32	Electrical Site Work	1	LS		
33	Branch Circuiting	1	LS		
34	Wiring Devices	1	LS		
				<i>Subtotal</i>	
				Total Cost	

	Additive Alternate #1 - SE Pump Basin				
35	Sewage Ejector Basin	1	LS		
				<i>Subtotal</i>	

TOTAL \$ _____

Bidder shall acknowledge by signing below, all information provided in the above bid schedule:

Bidder's Signature

Bidder's Name (Printed)

Title

Bidder further specifically acknowledges that Bidder examined and carefully studied the Bid Documents, including but not limited to the Invitation to Bid, Bidding Requirements, Contracting Requirements, Technical Specifications, Construction Drawings, and the following Addenda, receipt of all of which is hereby acknowledged: (List Addenda by number)

ADDENDA NUMBER

BIDDER'S BID BOND

(Here insert full name and address or legal title of Contractor)

As Principal, hereinafter called the Principal, and

(Here insert full name and address or legal title of Contractor)

A Corporation duly organized under the laws of the State of _____ as Surety, hereinafter called the Surety, are held and firmly bound unto Eastern Oregon University, as Obligee, hereinafter called Obligee, in the sum of ten percent (10%) of the total amount of the Bid for Work herein described, for the payment of which sum well and truly be made, as agreed and liquidated damages, the said Principal and the said Surety, bind ourselves, our heir, executors, administrators, successors and assigns, jointly and severally, firmly by these presents

WHEREAS, the Principal has submitted a Bid for the Eastern Oregon University West Steam Distribution Main Replacement project.

NOW, THEREFORE, if the Obligee shall accept the Bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such Bid, and given such good and sufficient payment and performance bonds as may be specified in the Contract Documents for the faithful performance of such Contract and for the prompt payment of labor and materials furnished in the prosecution thereof, then this obligation shall be null and void, otherwise remain in full force and effect.

The Surety, for value received, hereby stipulates, and agreed that the obligation of the Surety and this bond shall be in no way impaired or affected by any extension of time within which the Obligee may accept such Bid, and the Surety does hereby waive notice of any such extension.

(Seal)
PRINCIPAL

Title

Address

(Seal)
SURETY

Title

Address

CONTRACTOR'S REGISTRATION

NAME OF FIRM:

ADDRESS:

Oregon State Department of Labor and Industries Contractor Registration Number:

SIGNATURE:

By: _____ Date: _____

Title: _____

RESPONSIBILITY INQUIRY FORM

EOU will determine responsibility of a Firm prior to award and execution of a contract. In addition to this form, EOU may obtain any information EOU deems necessary to make the determination. EOU will notify the firm of any other documentation required, which may include, but is not limited to, Oregon Department of Revenue Letter of Debt Compliance, recent financial information, bonding capacity, credit information, record of performance under previous contracts, etc. EOU may postpone the award of the Contract in order to complete its investigation and evaluation. Failure to promptly provide requested information and clearly demonstrate Responsibility may result in a rejection and ineligibility of contract award.

1. Does your firm have the appropriate financial, material, equipment, facility, and personnel resources and expertise, or ability to obtain the resources and expertise, necessary to demonstrate the capability of the firm to meet all contractual obligations? YES ☐ / NO ☐
2. The number of years in business providing services/goods/equipment required under the prospective contract: _____
3. a) is your firm experiencing financial distress or having difficulty securing financing? YES ☐ / NO ☐
b) Does your firm have sufficient cash flow to fund day to day operations throughout the contract period? YES ☐ / NO ☐

If "YES" on question 3.a) or "NO" on question 3.b) please provide additional details:

Response

4. Within the last 3- year period has your firm had one or more contracts terminated for default by any federal, state, or local government agency, or any lawsuits filed against it by creditors or involving credit disputes? YES ☐ / NO ☐

If "YES" please explain (without regard to judgements, including jurisdiction and date of final judgement or dismissal)

Response

5. Within the last 3- year period has your firm filed for bankruptcy action, filed for reorganization, made a general assignment of assets for benefits of creditors, or had an action for insolvency institute against it? YES ☐ / NO ☐

If "YES" indicate the filing dates, jurisdictions, type of actions, ultimate resolution, and dates of judgement or dismissal, if applicable.

Response

6. Does your firm have all required licenses, insurance and/or registrations to complete the Work and is the firm legally authorized to do business in the State of Oregon? YES ☐ / NO ☐

If "No", please explain.

Response

7. Within the last 5- year period has your firm completed projects of similar nature, included cultural permit requirement, with a satisfactory record of performance? [For purposes of this question, a satisfactory record of performance means that the cost associated with and time available to perform a previous contract remained within your firms control, your firm stayed within the time and budget allotted for the procurement and otherwise performed the contract in a satisfactory manner.]

YES ☐ / NO ☐

If "No" please explain.

Response

AUTHORIZED SIGNATURE:

By signature below, the undersigned Authorized Representative on behalf of the Bidder certifies that the responses provided on this form are complete, accurate, and not misleading:

Name of firm:	RFP# FP-2022-03 EOU West Steam Distribution Main Replacement
Authorized Signature:	Date:
Print Name:	Title:

FIRST TIER SUBCONTRACTOR DISCLOSURE

Instructions for Submitting Form

Submit the First-Tier Subcontractor Disclosure form in any of the following manners:

- With the bid.
- No later than ***two working hours*** after the time set for opening bids. (For example, by 4:00 p.m. after a 2:00 p.m. bid closing) in the same manner as the bids were submitted.

Instruction for First-Tier Subcontractor Disclosure

When the contract value for a public improvement is greater than \$100,000 bidders are required to disclose information about first-tier subcontractors that will furnish labor or labor and materials (See ORS 279C.370). Specifically, when the contract amount of the first-tier subcontractor is greater than or equal to: (1) 5% of the total project bid, but at least \$15,000, or (2) \$350,000 regardless of the percentage of the total project bid, you must disclose the following information about the subcontractor not later than two working hours after the time set for opening bids:

- The name of the subcontractor.
- The Category of work that the subcontractor will be performing.
- The dollar value of the subcontract

If your bid is greater than \$100,000 and you will not be using any first-tier subcontractors, you are still required to submit the form, with the appropriate box checked or enter "NONE" on the first line.

If your bid is greater than \$100,000 and you are not subject to the above disclosure requirements, you are still required to submit the form, with the appropriate box checked or enter "NONE" on the first line.

THE OWNER MUST REJECT BIDS if the bidder fails to submit the disclosure form with this information by the stated deadline.

To determine disclosure requirements, the Owner recommends that you disclose subcontractor information for any subcontractor as follows:

8. Determine the lowest possible prime contract price. That will be the base bid amount less all alternate deductive bid amounts (exclusive of any options that can only be exercised after bid award).
9. Provide the required disclosure information for any first-tier subcontractor whose potential contract services are greater than or equal to: (1) 5% of the lowest contract price, but at least \$15,000, or (2) \$350,000 regardless of the percentage. Total all possible work for each subcontract in making this determination, (for example, if a subcontract will provide \$15,000 worth of services on the base bid and \$40,000 on an additive alternate, then the potential amount of the subcontractor's services is \$55,000. Assuming that \$55,000 exceeds 5% of the lowest contract price, provide the disclosure for both the \$15,000 and the \$40,000 services).

FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

Project Name: _____

Owner: _____

Bid Opening Date: _____

Name of Bidding Contractor: _____

Contact Name: _____ **Phone No:** _____

☐ *CHECK THIS BOX IF YOU WILL NOT BE USING ANY FIRST-TIER SUBCONTRACTORS OR IF YOU ARE NOT SUBJECT TO THE DISCLOSURE REQUIREMENTS (SEE INSTRUCTIONS).*

FIRST-TIER SUBCONTRACTORS

Firm Name	
Category of Work	\$

Firm Name	
Category of Work	\$

Firm Name	
Category of Work	\$

Firm Name	
Category of Work	\$

Firm Name	
Category of Work	\$

Firm Name	
Category of Work	\$

Firm Name	
Category of Work	\$

(Attach additional sheets as necessary)

It is the responsibility of Bidders to submit this Disclosure Form and any additional sheets, with the Project Name clearly marked, at the location indicated by the specified disclosure deadline. See Instructions to Bidders.

EASTERN OREGON UNIVERSITY
PUBLIC IMPROVEMENT CONTRACT # FP-2022-03

This Public Improvement Contract for **Eastern Oregon University West Steam Distribution Main Replacement Project**, made by and between EOU, hereinafter called “Owner”, and « _____ » hereinafter called the “Contractor” (collectively the “Parties”), shall become effective on « _____ » or the date this Public Improvement Contract has been signed by all the Parties and all required EOU Administrative approvals have been obtained, whichever is later.

Project Name and Description:

Eastern Oregon University West Steam Distribution Main Replacement located on the western portion of the campus in between Hoke Hall and Quinn Coliseum on the Owner’s campus.

Project Engineer:
Systems West Engineers
725 A Street
Springfield, OR 97477

The Owner and the Contractor agree as follows:

I. Contract Documents, Contract Price, and Work.

A. The Contract Documents. The Contract Documents include the documents identified as such in the Eastern Oregon General Conditions for Public Improvement Contracts (the “General Conditions”) and as enumerated below and any amendments or modifications executed by the parties pursuant to the terms of the Contract. Unless otherwise stated, terms used in this Public Improvement Contract have the definition assigned to them in the General Conditions.

B. Contract Price. The Contractor, in consideration of the Contract Price of \$« _____ » be paid to the Contractor by Owner in the manner and at the time provided in the Contract Documents, and subject to the terms and conditions provided for in the Contract Documents, hereby agrees to perform all Work described in and reasonably inferred from the Contract Documents. The Contractor acknowledges and agrees that the Contract Price is a lump sum, which shall be subject to additions or deductions only as provided in the Contract Documents. Contractor further agrees that Contractor is solely responsible for all costs of completing the Work that exceed the Contract Price and that Contractor is deemed to have allowed correct and sufficient amounts in the Contract Price to cover its related obligations under or arising from the Contract. The Contractor shall fully execute the Work described in the Contract Documents and all Work reasonably inferable therefrom, with the exception of any Work specifically indicated in the Contract Documents to be the responsibility of others.

II. Date of Commencement and Completion

A. Commencement. The date of the commencement of the Work shall be Monday, March 9, 2026

B. Substantial Completion, Final Completion, and Liquidated Damages for Delay

1. Substantial Completion. Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

[« »] By the following date: Friday, September 11, 2026.

2. Final Completion. Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Final Completion of the entire Work within 45 Days of achieving Substantial Completion.

3. Liquidated Damages for Delay. Performance of the Work within the Contract Time, including but not limited to achieving Substantial Completion by the date required by the Contract Documents, is the essence of the Contract. The Contractor acknowledges that the Owner will sustain damages as a result of the Contractor's failure to achieve Substantial Completion of the Project in accordance with the Contract Documents. These damages may include, but are not limited to, delays in completion and use of the Project, and costs associated with Contract administration, additional costs paid to the Architect and the Owner's other contractors and consultants, and use of temporary facilities. The Contractor and the Owner acknowledge that the actual amount of damages would be difficult to determine accurately and agree that the following liquidated damages figure represents a reasonable estimate of such damages and is not a penalty.

a. Liquidated damages will be **\$2,000** for each day or partial day of delay that Substantial Completion extends beyond the required date of Substantial Completion.

b. The Contractor agrees to pay to the Owner the liquidated damage sums set forth above for each day of delay or any fraction thereof, and further agrees that the Owner may deduct such sums from payments the Owner otherwise owes to the Contractor under the Contract. If such deduction does not result in payment to the Owner of the assessed liquidated damages in full, the Contractor will promptly pay any and all remaining sums due to the Owner upon demand.

III. Representatives.

A. Contractor's Representative. Contractor has named « » its' authorized Representative to act on its behalf in all matters related to the Contract. Contractor shall not remove or replace its representative without the written consent of the Owner. Contractor must submit a request to remove or replace its representative to the Owner at least 30 days prior to the proposed removal and replacement.

B. Owner's Representative. Unless otherwise specified in the Contract Documents, the Owner designates **John Garlitz, EOU Director of Facilities** as its authorized representative in the administration of this Contract. The above-named individual shall be the initial point of contact for matters related to Contract performance, payment authorization, and to carry out the responsibilities of the Owner.

IV. Payment

A. Progress Payments. Provided that the Contractor submits a complete application for payment meeting all requirements of Section E of the General Conditions by the [« »] day of the month and otherwise complies with the conditions for payment in the Contract Documents, the Owner shall pay to the Contractor the amount due under the Contract Documents by the [« »] day of the month.

B. Final Payment. Provided that the Contractor submits a complete application for payment meeting all requirements of Section E of the General Conditions and otherwise complies with the conditions for final payment in the Contract Documents and all other requirements for Final Completion are satisfied, the Owner shall pay to the Contractor the final amount due under the Contract Documents within [« »] days of the Owner's final acceptance of the Work. The Contractor's acceptance of final payment shall constitute a waiver of any and all claims by the Contractor and its Subcontractors.

C. Interest. Payments due and unpaid under the Contract shall bear interest from the date payment is due at the following rate: [« »].

V. Tax Compliance.

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

VI. Insurance and Payment and Performance Bonds.

A. Insurance. During the term of this Contract, Contractor shall comply and shall require all of its Subcontractors to comply with the insurance requirements set forth in Exhibit A and shall provide proof of such compliance, including copies of insurance policies, upon Owner's request.

B. Bonds. The Contractor shall obtain performance and payment bonds meeting the requirements of Section G.2 of the General Conditions.

VII. Dispute Resolution.

Claims and disputes arising out of the Contract or the Project that are not resolved pursuant to the Claims Review Process set forth in Section D.3 of the General Conditions shall be resolved by litigation as set forth in Section B.16 of the General Conditions.

VIII. Suspension and/or Termination

A. By the Owner. The Contract may be suspended or terminated by the Owner as set forth in Section J of the General Conditions.

B. By the Contractor. In addition, the Contractor may terminate the Contract for cause in the event that the Owner fails to pay undisputed amounts owed to the Contractor pursuant to the Contract Documents; provided that the Contractor provides seven (7) Days written notice of its intent to terminate and Owner fails to cure within such seven (7) Day period. In the event that the Contractor terminates for cause, the Contractor shall be entitled to compensation for Work properly executed. Contractor shall not be entitled to lost profit or other compensation for Work not performed.

IX. Integration

The Contract Documents constitute the entire agreement between the parties. There are no other understandings, agreements or representations, oral or written, not specified herein regarding this Contract. Contractor, by the signature below of its authorized representative, hereby acknowledges that it has read this Contract, understands it, and agrees to be bound by its terms and conditions.

X. Compliance with Law.

Contractor will comply with all federal, state, and local laws applicable to the Work under this Contract, and all regulations and administrative rules established pursuant to those laws, including without limitation, the following requirements of the Oregon Public Contracting Code set forth below, even if such requirements ordinarily would not

apply to the Work under ORS 352.138 as set forth in Section A.4.5 of the General Conditions. In the event of a conflict between the provisions set forth below and similar provisions in the General Conditions, the provisions set forth below will govern.

A. ORS 279C.605 (Notice of Claim on Bond). Any person claiming a right of action under ORS 279C.600 must file a notice of claim as provided in ORS 279C.605.

B. ORS 279C.800 to 279C.870 (Payment of Prevailing Wage Required).

1. This Contract is subject to payment of prevailing wages under ORS 279C.800 to 279C.870. Each worker the Contractor, subcontractor or other person who is party to the contract uses in performing all or part of the Contract must be paid not less than the applicable prevailing rate of wage for each trade or occupation as defined by the Director of the State of Oregon Bureau of Labor and Industries ("BOLI") in the applicable publication entitled Definitions of Covered Occupations for Public Works Contracts in Oregon. The latest prevailing wage rates for public works contracts in Oregon are contained in the following publications: The Prevailing Wage Rates for Public Works Projects in Oregon, the PWR Apprenticeship Rates, and any amendments to the PWR rates or Apprenticeship rates. Such publications can be reviewed electronically at http://www.boli.state.or.us/BOLI/WHD/PWR/pwr_state.shtml.

2. This Contract is not subject to payment of prevailing wages under the federal Davis-Bacon Act (40 U.S.C. 3141 et seq.). If this Contract is or becomes subject to payment of prevailing wages under the Davis-Bacon Act, Contractor and any subcontractors must pay the higher of the federal prevailing wage rate or the state prevailing wage. The latest federal prevailing wage rates can be reviewed electronically at <https://sam.gov/content/wage-determinations>. Contractors shall follow all prevailing wage rules including posting the Davis Bacon Poster at the worksite and submitting certified payroll records. The poster is available at <http://www.dol.gov/whd/regs/compliance/posters/fedprojc.pdf>. The payroll form is at <http://www.dol.gov/whd/forms/wh347instr.htm>.

3. The applicable prevailing wages under subsections will be those in effect on the start of the Construction Phase as described in Section 3.b of this Contract, and shall be incorporated in the GMP Amendment or, if applicable, the Early Work Amendment.

4. The Contractor and all Subcontractors will keep the prevailing wage rates for this Project posted in a conspicuous and accessible place in or about the Project.

5. The Owner will pay a fee to the Commissioner of the Oregon Bureau of Labor and Industries as provided in ORS 279C.825. The fee will be paid to the Commissioner under the administrative rule of the Commissioner.

6. If the Contractor or any Subcontractor also provides for or contributes to a health and welfare plan or a pension plan, or both, for its employees on the Project, it will post notice describing such plans in a conspicuous and accessible place in or about the Project. The notice will contain information on how and where to make claims and where to obtain future information.

C. ORS 279C.836 (Public Works Bond Required).

1. The Contractor will file a public works bond with the Construction Contractors Board pursuant to ORS 279C.836 before starting work on the Project, unless exempt under ORS 279C.836(2) (7) or (8).

2. The Contractor will include in every subcontract a provision requiring the Subcontractor to file a public works bond with the Construction Contractors Board pursuant to ORS 279C.836 before starting work on the Project, unless exempt under ORS 279C.836(2), (7) or (8).

D. ORS 279C.845 (Prevailing Wage Certification; Additional Retainage).

1. The Contractor and every Subcontractor will file certified statements with the Owner in writing in the form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each worker whom the Contractor or Subcontractor has employed upon such public work, and further certifying that no worker employed upon such public work 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 will be verified by the oath of the Contractor or the Contractor's surety or Subcontractor or Subcontractor's surety that the Contractor and any Subcontractor has read such statement and certificate and knows the contents thereof, and that the same is true to the Contractor or Subcontractor's knowledge. The certified statements will 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. Audit will need access to these documents to help verify and validate the labor portion of the Cost of the Work. See also Section C.2 of the General Conditions.

2. The certified statement will be delivered or mailed by Contractor or Subcontractor to the Owner. Certified statements for each week during which the Contractor or Subcontractor employs a worker upon the public work will be submitted once a month, by the fifth business day of the following month. Information submitted on certified statements may be used only to ensure compliance with the provisions of ORS 279C.800 to 279C.870. Notwithstanding any other provision of this Contract and in addition to any other retainage required under this Contract, the Owner will retain 25 percent of any amount earned by the Contractor until the Contractor filed the certified statements with the Owner as required by this Section. The Owner will pay the retainage required under this Section within 14 days after the Contractor files the certified statements required by this Section.

3. Contractor and each Subcontractor will preserve the certified statements for a period of three years from the date of completion of the Contract.

XI. Miscellaneous Provisions.

A. Headings. The headings used in the Contract are solely for convenience of reference, are not part of the Contract and are not to be considered in construing or interpreting the Contract.

B. Savings Clause. Should any provision of the Contract, at any time, be held to be invalid or unenforceable for any reason, and if the provisions of the Contract that are essential to each party's interests otherwise remain valid and enforceable, then the remaining provisions of the Contract shall remain in full force and effect and the court shall give the offending provision the fullest meaning and effect permitted by law.

C. Coordination of Work. The Contractor agrees to coordinate all Work with the activities of the Owner and the Owner's separate contractors and consultants at or adjacent to the Project site, including but not limited to the Owner's planned renovation of Inlow Hall, to minimize interference and disruption to such other activities. The Contractor specifically acknowledges that it has made consideration for the Inlow Hall renovation project in its schedule for the Project and in agreeing to the dates for Substantial Completion and Final Completion.

XII. Enumeration of Contract Documents

The Contract is comprised of the following Contract Documents:

A. This Public Improvement Contract

B. The General Conditions

C. Drawings:

G001 COVER SHEET - CONTACTS, VICINITY MAP, SITE MAP & SHEET INDEX

C001 NOTES SHEET

C101 EXISTING CONDITIONS AND DEMOLITION PLAN

C201 CIVIL SITE PLAN

C301 PLAN AND PROFILE SHEET (STA 1+00 - 5+00)

C302 PLAN AND PROFILE SHEET (STA 5+00 - 9+87)

C401 DETAIL SHEET

P001 LEGEND, GENERAL NOTES, SCHEDULES, & SHEET INDEX

P101 DEMO PLAN - QUINN BASEMENT

P120 FOUNDATION PLAN - QUINN BASEMENT

P121 FLOOR PLAN - QUINN BASEMENT

P501 DETAILS

M001 LEGEND, GENERAL NOTES, SCHEDULES, & SHEET INDEX

M098 SITE DEMO PLAN

M099 SITE PLAN

M101 DEMO PLAN - QUINN BASEMENT

M121 FLOOR PLAN - QUINN BASEMENT

M501 DETAILS

M502 VAULT DETAILS & TUNNEL SECTIONS

E001 LEGEND, GENERAL NOTES, SCHEDULES, & SHEET INDEX

E099 SITE PLAN

E121 FLOOR PLAN - QUINN BASEMENT

E122 FLOOR PLANS - QUINN AND HOKE FIRST FLOOR

D. Specifications:

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

00 00 00 COVER

00 10 00 INVITATION FOR BIDS

00 20 00 INSTRUCTION TO BIDDERS

00 30 00	AVAILABLE INFORMATION
00 40 00	PROCUREMENT FORMS
00 50 00	PUBLIC IMPROVEMENT CONTRACT
00 60 00	PERFORMANCE AND PAYMENT BOND
00 70 00	EOU GENERAL CONDITIONS FOR PIC

DIVISION 01 – GENERAL REQUIREMENTS

01 10 00	SUMMARY OF WORK
01 20 00	PRICE AND PAYMENT PROCEDURES
01 30 00	ADMINISTRATIVE REQUIREMENTS
01 31 13	PROJECT COORDINATION
01 32 00	CONSTRUCTION PROGRESS SCHEDULES
01 33 00	SUBMITTAL PROCEDURES
01 45 00	CONTRACTOR QUALITY CONTROL
01 45 30	TESTING LABORATORY SERVICES
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 56 39	TREE AND PLANT PROTECTION
01 61 16	VOC CONTENT RESTRICTIONS
01 63 00	PRODUCT SUBSTITUTIONS
01 70 00	CONTRACT CLOSEOUT
01 74 00	CLEANING
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 78 00	CLOSEOUT SUBMITTALS
01 79 00	DEMONSTRATION AND TRAINING

DIVISION 02 – EXISTING CONDITIONS

02 41 00	DEMOLITION AND SALVAGE

DIVISION 22 – PLUMBING

22 05 00	GENERAL PLUMBING PROVISIONS
22 05 17	SLEEVES, SLEEVE SEALS, AND ESCUTCHEONS FOR PLUMBING PIPING
22 05 23	VALVES FOR PLUMBING PIPING
22 05 29	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
22 05 53	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
22 13 16	SANITARY WASTE, VENT, AND STORM DRAIN PIPING
22 13 29	SANITARY SEWAGE AND STORMWATER PUMPS

DIVISION 23 – HVAC

23 05 00	GENERAL HVAC PROVISIONS
23 05 13	COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT
23 05 17	SLEEVES, SLEEVE SEALS, AND ESCUTCHEONS FOR HVAC PIPING
23 05 19	METERS AND GAGES FOR HVAC PIPING
23 05 23	VALVES FOR HVAC PIPING
23 05 29	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
23 05 53	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
23 07 19	HVAC PIPING INSULATION
23 09 23	BUILDING AUTOMATION SYSTEMS FOR HVAC
23 09 29	BAS SEQUENCE OF OPERATIONS FOR HVAC
23 21 10	UNDERGROUND HVAC PIPING
23 21 15	SNOW MELTING SYSTEM
23 22 13	STEAM AND CONDENSATE HEATING PIPING
23 22 16	STEAM AND CONDENSATE PIPING SPECIALTIES
23 22 23	STEAM CONDENSATE PUMPS

DIVISION 26 – ELECTRICAL

26 05 00	GENERAL ELECTRICAL PROVISIONS
26 05 01	ELECTRICAL DEMOLITION
26 05 19	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 27 26	WIRING DEVICES
26 28 16	OVERCURRENT PROTECTIVE DEVICES
26 29 13	MOTOR AND CIRCUIT DISCONNECTS

DIVISION 31 – EARTH WORK

31 20 00	EARTH MOVING
31 23 19	DEWATERING

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 13 13	CONCRETE PAVING
32 91 19	LANDSCAPE GRADING
32 92 00	TURF AND GRASSES

DIVISION 33 – UTILITIES

33 05 63	CONCRETE VAULT

E. Addenda, if any:

All addenda issued.

F. The following exhibits:

Exhibit A: Contractor's Required Insurance

G. The Solicitation Document and addenda thereto, Instructions to Offerors, and Supplemental Instructions to Offerors

H. The accepted Offer

I. Contract Amendments, Change Orders, and Change Directives issued after execution of this Public Improvement Contract.

To the extent that the accepted Offer includes disclaimers or limitations of liability, they are expressly rejected and not made part of the Contract unless otherwise expressly incorporated herein. Any conflict or discrepancy between the accepted Offer and any other Contract Documents shall be resolved in favor of the other Contract Documents or the interpretation requiring the greater quantity or quality of work. Conflicts and discrepancies between Contract Documents not involving the accepted Offer shall be resolved in the manner set forth in Section A.3.1 of the Contract Documents.

In witness whereof, Eastern Oregon University executes this Contract and the Contractor does execute the same as of the day and year indicated below.

CONTRACTOR DATA:

Contractor Name and Address:

CONTRACTOR FEDERAL TAX ID #: _____

CONTRACTOR CCB: _____

Expiration Date: _____

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

SIGNATURES:

CONTRACTOR SIGNATURE:

By _____
Signature Date

Print Name Title

By _____
John Garlitz, Director Date
Director of Facilities & Planning

By _____
LeeAnn Case, Vice President Date
Vice President of Finance & Administration

PUBLIC IMPROVEMENT CONTRACT – EXHIBIT A

INSURANCE REQUIREMENTS

Project No. FP-2022-03

I. CONTRACTOR’S INSURANCE

As a condition precedent to payment Contractor shall at all times provide and maintain for itself and require its Subcontractors to provide and maintain the following types and the following minimum limits of insurance written on an occurrence basis by a company or companies rated A/IX or better in the most recent edition of “Best’s Insurance Guide” (or such lesser rating as may be approved by Owner in writing) and authorized to do business in the state in which the Project is located.

A. Workers’ Compensation and Employer’s Liability:

- (i) State: Statutory
- (ii) Employers Liability:
 - \$1,000,000 Each Accident
 - \$1,000,000 Each Disease
 - \$1,000,000 Disease, Each Employee

B. Commercial General Liability (Occurrence Form):

- (i) Combined Bodily Injury and Property Damage:
 - \$2,000,000 Each Occurrence
 - \$2,000,000 Personal and Advertising Injury
 - \$4,000,000 General Aggregate
 - \$4,000,000 Products/Completed Operations Aggregate
 - \$ 50,000 Fire Damage Legal Liability
 - \$ 10,000 Medical Expenses Per Person
- (ii) These limits may be satisfied using any combination of primary CGL and excess/umbrella coverage so long as the excess/umbrella is true follow-form and meets the scope of coverage and exclusions outlined herein.

The scope of coverage must meet the following:

- (1) Premises Operations must be included.
- (2) Elevators and Escalators must be included.
- (3) Coverage for Independent Contractors and work performed on your behalf by subcontractors must be included.
- (4) Pollution Liability and Hazardous Materials Liability must be included.

- (5) Contractual Liabilities must be included (including the contract obligations specified in the Indemnification Paragraph(s) of the Owner-Contractor Agreement)
- (6) The Products and Completed Operations Insurance must be carried for the duration of the applicable statute of repose or for six (6) years after final payment, whichever is longer.
- (7) There can be no exclusions for subsidence, collapse, explosion or underground property damage.
- (8) There can be no Additional Insured vs. Named Insured cross-suit exclusion. The policies shall provide for cross-liability coverage as would be achieved under the standard Insurance Services Office "separation of insureds" clause.
- (9) There shall be no Montrose language, anti-pyramiding exclusion, or exclusion limiting coverage to damages which first begin to occur within the policy period.
- (10) The limits shall not be eroded or wasted by defense costs.
- (11) The policy and the additional insured coverage shall be primary and non-contributory with any insurance maintained by Owner, its affiliates, subsidiaries, directors, officers, employees and agents. (Copies of all policy endorsements that might affect coverage for the Project must be provided with the Insurance Certificate.)
- (12) The policy may not contain a cyber terrorism exclusion.
- (13) The policy may not contain an exclusion for breach of contract.
- (14) The policy may not contain an exclusion for intangible property.
- (15) The policy may not contain an exclusion for property of others in your care, custody or control.

C. Business Auto:

Combined Bodily Injury and Property Damage

\$1,000,000 Each Accident

The following coverages must be included:

- (1) Owned Automobiles
- (2) Non-Owned and Hired Automobiles

D. Excess/Umbrella Liability Coverage:

\$5,000,000 Each Occurrence with a per project endorsement

\$5,000,000 Aggregate

Coverage will follow form on the general liability and auto liability policies be at least as broad those policies.

Coverage shall be carried for the duration of the applicable statute of repose or for six (6) years after final payment, whichever is longer.

The policy must provide that coverage will be triggered by exhaustion of the applicable primary policies above and shall not require payment or exhaustion of any other policies.

- E. Professional Liability Insurance.** Limits shall not be less than \$1,000,000 per claim and \$2,000,000 aggregate. Such insurance must have no exclusion for bodily injury or property damage and no exclusion for pollution-related liability. This insurance shall include a retroactive date which predates the commencement of Work under the Agreement, including but not limited to construction manager services, and such coverage must

continue for or include an extended reporting period of at least six (6) years after substantial completion and acceptance of the Project, or until the expiration of all applicable statute of repose, whichever is longer.

- F. Certificates and Certified Copies of Policies.** Copies of all policy endorsements that might reduce coverage from that provided by the standard ISO form must be provided to Owner and approved in writing and Owner's approval must be submitted to Owner with each Insurance Certificate warranting that there is no other reduction in coverage. Evidence of Contractor's compliance with this Exhibit, including the insurance required of Subcontractors, shall be filed with Owner and be acceptable to Owner prior to commencement of the Work. For those insurance coverages that are required to remain in force after final payment, additional certificates (or certified copies of the policies) evidencing continuation of such coverage shall be submitted at the time of the application for final payment and upon each annual renewal for the duration of coverage required. Without limiting its remedies, Contractor agrees that it will reimburse Owner for the costs of Owner's insurance provided for the Project if Contractor fails to provide evidence of coverage as required herein. Upon Owner's request at any time, Contractor will immediately provide an actual certified copy of its insurance policies. Provision of the certificates and copies of policies as required herein shall be a condition precedent to payment.
- G. Notice of Cancellation, Reduction or Expiration.** Insurance policies required by this Agreement shall contain a provision that coverages or limits afforded under the policies will not be canceled, reduced or allowed to expire until at least 30 days' prior written notice has been given to Owner or, in the alternative, Contractor shall, in writing, inform Owner that Contractor shall provide 30 days written notice to Owner before any policy expires or is cancelled. Information concerning reduction of limits on account of claims paid or to be paid shall be furnished by the Contractor to Owner within three (3) business days of when Contractor learns that revised or reduced limits are likely. When Contractor becomes aware of imminent cancellation, expiration or reduction in coverage or available limits, Contractor within three (3) business days shall procure other policies of insurance that meet all requirements of this Agreement without any lapse in coverage and notify Owner in writing of the potential reduction in coverage or cancellation and describe the manner in which it has provided or will provide replacement coverage of this insurance along with a written explanation of any differences in coverage. No work will be performed without this insurance being in full force and effect.
- H. Owner's Right to Terminate or Cure.** Failure of Contractor or a Subcontractor to secure and maintain insurance with the coverages and limits required by this Agreement shall be a material breach of the Contract entitling Owner, in its discretion and without waiving any other remedies, to (i) withhold payments or recoup payments already made to Contractor for work on the Project, (ii) terminate the Contractor for cause, and (iii) purchase replacement insurance at the expense of the Contractor. Contractor consents to Owner procuring replacement insurance in Contractor's name and Contractor will cooperate in all respects with Owner's efforts in this regard. Alternatively, at Owner's discretion, Owner may purchase an Owner's protective policy or other similar policy that affords to Owner coverages and limits providing reasonably equivalent protections as Owner would have received if Contractor and Subcontractors maintained the insurance required by this Agreement. Owner's costs incurred in finding replacement insurance or an Owner's protective policy shall either be reimbursed directly by Contractor or may be offset against amounts owed by Owner to Contractor on this Project or other projects.
- I. Insurance In Excess of Requirements.** In the event Contractor or any Subcontractor(s) purchase insurance in excess of the coverages or limits required under this Agreement, such excess coverages or limits shall apply and be deemed to have been required herein and be compliant with all requirements of this Exhibit.
- J. No Waiver by Owner.** The insurance requirements under this Agreement can only be waived or modified by Owner by an express written instrument signed by Owner acknowledging the reduced coverages or limits. No other act or omission by Owner or its agents, including but not limited to (i) implicit or verbal acceptance or approval of reduced coverages or limits or (ii) failure to require proof of compliant insurance, shall amount to Owner's waiver of the insurance requirements of this Agreement.

- K. Subcontractor Insurance.** All Subcontractors' insurance shall meet all insurance requirements of Contractor as provided in this Agreement, including, but not limited to, the types of insurance, extent and durations of coverages, and notice requirements, except that the limits of insurance for Subcontractors shall be no less than the following:

Workers' Compensation and Employer's Liability: same as above.

Commercial General Liability (Occurrence Form): Combined Bodily Injury and Property Damage:

\$2,000,000 Each Occurrence

\$2,000,000 Personal and Advertising Injury

\$2,000,000 General Aggregate

\$2,000,000 Products/Completed Operations Aggregate

\$100,000 Fire Damage Legal Liability

\$10,000 Medical Expenses Per Person

Business Auto: same as above.

Excess/Umbrella Liability Coverage: none required.

- L. Waiver of Subrogation.** All of General Contractor's and all of its subcontractors' liability insurance policies, including worker's compensation, shall contain a waiver of subrogation against Owner.

- M. Additional Insureds.** All of General Contractor's and Subcontractors' liability insurance policies shall contain an endorsement expressly naming Owner, its affiliates, subsidiaries, directors, officers, employees and agents (including but not limited to those listed below) as Additional Insureds (as opposed to blanket endorsements) for both on-going operations and completed operations. The coverage under the additional insured endorsement shall (i) be primary and noncontributory with respect to any insurance maintained by the Additional Insureds, (ii) provide the same coverages and limits to the Additional Insured as are afforded to the Named Insured as required by this Agreement, (iii) shall provide coverage to the Additional Insureds for the products-completed operations hazard, (iv) these requirements are to be complied with for the same durations as the coverages afforded to the Named Insured as required by this Agreement, and (v) waive all rights of subrogation against the Additional Insureds. In the event that Contractor cannot comply with all of these requirements, Contractor shall obtain a Project Specific Endorsement naming Owner and its affiliates as Named Insureds on all primary and excess/umbrella policies required herein. The following additional persons or entities affiliated with Owner shall be named as Additional Insureds:

- N. Cyber.** Contractor and its subcontractors shall maintain throughout the term of this Agreement Professional / Technology Liability insurance and Network Security & Privacy Liability insurance covering liabilities for first- and third-party losses resulting or arising from acts, errors, or omissions in connection with the services provided under this Agreement. Such insurance shall have limits of not less than \$5,000,000.00. Such coverage shall include an extended reporting period of not less than 90 days beyond the termination date of such coverage. The coverage must be sufficient to cover all damages Contractor or its subcontractors and vendors

may be obligated to pay as damages as a result of a Security Breach. For the purposes of this Section, "Security Breach" means:

- (i) the failure by the Contractor, or any of its subcontractors, to properly handle, manage, store, destroy or otherwise control, or the unauthorized disclosure by the Contractor or its subcontractors of:
 - (a) Personal information in any format, including but not limited to Protected Health Information or other personal / individual data or information regarding health, financial or other information that is generally considered private in nature; or
 - (b) third party corporate information in any format specifically identified as confidential and protected under a confidentiality agreement or similar contract; or
 - (c) any other information the release or disclosure of which may cause liabilities for first- and third-party losses resulting or arising from acts, errors, or omissions in connection with the services provided under this Agreement.
- (ii) an unintentional violation of the Contractor's privacy policy or
- (iii) any misappropriation that results in the violation of any applicable data privacy laws or regulations; or
- (iv) any other act, error, or omission by Contractor in its capacity as such which is reasonably likely to result in the unauthorized disclosure of Personal Data or loss of Confidential or Personal Information, regardless of cause (including, without limitation, Contractor's or its subcontractor's negligence and unlawful third-party acts).

The Cyber coverage must provide coverage of the following:

- (i) Wrongful acts, claims, and lawsuits anywhere in the world.
- (ii) Contractual liability coverage for the indemnity in this Agreement.
- (iii) Coverage for all damages incurred by Company or its affiliates including, defense costs, forensics investigation, public relations/crisis management costs, data breach notification costs, credit protection services, credit restoration services, regulatory investigations, civil fines and penalties, data breach mitigation services, litigation costs and settlement costs.
- (iv) Violation or infringement of any right of privacy, including breach of security and breach of security/privacy laws, rules or regulations globally, now or hereinafter constituted or amended.
- (v) Data theft, damage, or any loss of data.
- (vi) Unauthorized disclosure, destruction, or corruption, including without limitation, unauthorized access, unauthorized use, identity theft, theft of personally identifiable information or confidential corporate information in whatever form.
- (vii) Transmission of a computer virus or other type of malicious code.
- (viii) Participation in a denial-of-service attack on third party computer systems.
- (ix) Loss or denial of service.
- (x) Privacy regulatory defense and payment of civil fines.
- (xi) Payment of credit card provider penalties, and breach response costs (including without limitation, notification costs, forensics, credit protection services, call center services, identity theft protection services, and crisis management/public relations services).

O. Builders Risk - Contractor shall procure and pay for an All Risk Builder's Risk Policy, providing full replacement value, covering Owner, Contractor and all Subcontractors of every tier as their interests may appear. The policy shall include coverage for theft, vandalism, malicious mischief, collapse, windstorm, falsework, testing and startup, temporary buildings and debris removal, including demolition and replacement occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss. The policy shall provide Flood and Earthquake coverage, cover damage from water from any source, cover materials in temporary storage or transit and provide coverage for resultant damage even if caused by faulty workmanship or defective products. The policy shall not have any co-insurance provisions. Deductibles shall be approved by Owner in writing or shall be the sole obligation of the Contractor.

END OF EXHIBIT A

PERFORMANCE AND PAYMENT BOND

Know all persons by these presents, that _____, hereinafter called the PRINCIPAL, and _____ a CORPORATION or partnership duly authorized to do a general surety business in Oregon, as SURETY, are jointly and severally held and bound unto the Eastern Oregon University in La Grande, Oregon, hereinafter called the OBLIGEE in the sum of

DOLLARS _____ (\$ _____)

for the payment of which we jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns, firmly by these presents.

The condition of this bond is such that, whereas, _____

(Contractor)

the PRINCIPAL herein, on the _____ Day of _____, entered into a Contract with the OBLIGEE, for the _____ Project, which Contract is made a part hereof as if fully incorporated herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that if Principal shall faithfully, punctually and completely perform and abide with the covenants, terms, conditions and provisions of said Contract and any extensions thereof in all respects and within the time prescribed therein, including, but not limited to, the terms of any warranty and guarantee required under the said Contract; shall pay all laborers, mechanics, subcontractors, material and equipment suppliers and all persons supplying to Principal or its subcontractors and suppliers at any tier labor, materials, supplies or equipment for the prosecution of the work or any part thereof; shall fully defend, indemnify and hold Obligee harmless from all cost and damage that Obligee may suffer by reason of Principal's failure to do so; and shall in all respects perform said Contract according to applicable law, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

In any event, this obligation shall remain in full force and effect for the applicable period of limitations or repose, whichever is longer.

Surety acknowledges that Obligee does not owe any duty to Surety to advise, notify or consult with Surety on any matters relating to the Principal or the Project, including, but not limited to, Principal's payments to Subcontractors or Principal's use of Project funds.

No prepayment or delay in payment and no change, extension, addition or alteration of any provision of said Contract and no forbearance on the part of Obligee shall operate to relieve Surety from liability on this bond, and Surety hereby consents to any such changes, extensions, additions and alterations without further notice to or consent by Surety.

In the event arbitration, litigation or any other proceeding is brought upon this bond by Obligee and judgment or award is entered in Obligee's favor, Surety shall pay all of Obligee's costs incurred in such arbitration, litigation or other proceeding, including any attorney and expert witness fees.

In the event there is an arbitration clause in said Contract, Surety agrees to participate in and to be bound by any such arbitration to the same extent Principal is bound.

No right of action shall accrue on this bond to or for the use of any person or corporation other than Obligee or its heirs, executors, administrators, successors or assigns.

Executed this _____ day of _____, 2026.

(Seal)
PRINCIPAL

Title

Address

(Seal)
SURETY

Title

Address

COUNTERSIGNED:

Resident Agent

Address

PAYMENT BOND

(Bond No.)

KNOW ALL MEN BY THESE PRESENTS, that the undersigned, _____
_____ as Principal and _____ as Surety, a
corporation organized and existing under the laws of the state of _____, are held and bound
unto Eastern Oregon University in La Grande, Oregon, for the use and benefit of all persons or entities
that provide labor, materials, equipment or supplies for use under the Contract described below, in the
penal sum of _____ Dollars (\$ _____), lawful money of the United States of
America, for the payment of which Principal and Surety bind themselves and their heirs, executors,
administrators, successors and assigns, jointly and severally.

WHEREAS the Principal has entered into a Contract dated _____, 2026 with Obligee for
the _____ project ("Project"), which Contract is made a part hereof as if fully
incorporated herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that if Principal
shall promptly make payment to all persons or entities that provide labor, material, equipment or supplies
for use under said Contract, then this obligation shall be null and void; otherwise, it shall remain in full
force and effect.

In any event, this obligation shall remain in full force and effect for the applicable period of
limitations or repose, whichever is longer.

Surety acknowledges that Obligee does not owe any duty to Surety to advise, notify or consult
with Surety on any matters relating to the Principal or the Project, including, but not limited to,
Principal's payments to Subcontractors or Principal's use of Project funds.

Principal and Surety hereby jointly and severally agree that any person or entity that provides
labor, material, equipment or supplies for use under said Contract and has not been paid in full may sue
on this bond for the use of such person or entity, prosecute the suit to final judgment for such sums as
may be justly due and owing claimant and have execution thereon. Obligee shall not be liable for the
payment of any damages, costs or expenses (including attorney fees) awarded in any such suit.

No prepayment or delay in payment and no change, extension, addition or alteration of any
provision of said Contract and no forbearance on the part of Obligee shall operate to relieve Surety from
liability on this bond, and Surety hereby consents to any such changes, extensions, additions and
alterations without further notice to or consent by Surety.

In the event arbitration, litigation or any other proceeding is brought upon this bond by Obligee
and judgment or award is entered in Obligee's favor, Surety shall pay all of Obligee's costs incurred in
such arbitration, litigation or other proceeding, including any attorney and expert witness fees.

Except as expressly provided above, no right of action shall accrue on this bond to or for the use of any person or corporation other than Obligee or its heirs, executors, administrators, successors or assigns.

Executed this _____ day of _____, 2026.

(Seal)
PRINCIPAL

Title

Address

(Seal)
SURETY

Title

Address

COUNTERSIGNED:

Resident Agent

Address

END OF SECTION

EASTERN OREGON UNIVERSITY GENERAL CONDITIONS FOR PUBLIC IMPROVEMENT CONTRACTS

September 21, 2021

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

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**EASTERN OREGON UNIVERSITY
GENERAL CONDITIONS FOR PUBLIC
IMPROVEMENT CONTRACTS**

(“Eastern Oregon University General Conditions”)

**SECTION A
GENERAL PROVISIONS**

A.1 DEFINITION OF TERMS

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

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

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

CHANGE ORDER, means a written order which, when fully executed by the Parties to this Contract, constitutes a change to the Contract Documents. Change Orders shall be issued in accordance with the changes provisions in Section D and, if applicable, establish a Contract Price or Contract Time adjustment. A Change Order shall not be effective until executed as a Change Order.

CLAIM, means a claim, dispute, controversy, request, notice, demand or other problem asserted 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 Eastern Oregon University General Conditions.

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

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

CONTRACT DOCUMENTS, means the Public Improvement Contract, Eastern Oregon University General Conditions, Supplemental General Conditions if any, Plans, Specifications, Construction Change Directives, the accepted Offer, Solicitation Document and addenda thereto, Instructions to Offerors, and Supplemental Instructions to Offerors.

CONTRACT PERIOD, as set forth in the Contract Documents, means the total period of time beginning with the full execution of a Contract and, if applicable, the issuance of a Notice to Proceed and concluding upon Final Completion. However, this definition of Contract Period will not establish a period of limitation or repose with respect to the enforcement any obligations either Owner or Contractor have under the Contract Documents.

CONTRACT PRICE, means the total amount payable to Contractor as adjusted in accordance with the Contract Documents.

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

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

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

DIRECT COSTS, means, unless otherwise provided in the Contract Documents: the cost of materials, including sales tax and the cost of delivery; cost of labor which shall only include the applicable prevailing wage and fringe benefit (if applicable, and if paid to or on behalf of the employee) rate plus a maximum of a 10% markup on the prevailing wage (but not the fringe benefit) to cover Contractor’s labor burden including but not limited to social security, Medicare, unemployment insurance, workers’ compensation insurance; substantiated project cost increases for specific insurance (including, without limitation, Builder’s Risk Insurance and Builder’s Risk Installation Floater) or 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; travel expense reimbursement only if specifically authorized and only to the extent allowable under the Eastern Oregon University Contractor Travel Reimbursement Policy, hereby incorporated by reference.

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, pandemic (except for the COVID-19 pandemic), 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.

D/M/W/ESB/SDVBE REPORT, means an accurate report by the Contractor to the Owner identifying all disadvantaged business enterprises, minority-owned businesses, women-owned businesses, emerging small businesses, and service disabled business enterprises (D/M/W/ESB/SDVBE), as those terms are defined in ORS 200.005, or as self-reporting as otherwise meeting the same requirements of ORS 200.005, receiving contracts throughout the course of the Work. An initial D/M/W/ESB/SDVBE Report is required (see Section E.2.9) and D/M/W/ESB/SDVBE 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 D/M/W/ESB/SDVBE and the dollar value of their respective contracts and subcontracts. The annual reports shall include the total number of contracts and subcontracts awarded to D/M/W/ESB/SDVBE, 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 D/M/W/ESB/SDVBE and the dollar value of their respective contracts and subcontracts including all Contracts and Change Orders incorporated during the course of the project.

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

OFFER, means a bid in connection with Instructions to Bidders or a proposal in connection with a Request for Proposals, or Solicitation Document. May also be referenced as “Bid”, “Quote”, or “Proposal” based on the type of Solicitation Document

OFFEROR, means a bidder in connection with Instructions to Bidders or a proposer in connection with a Request for Proposals, or Solicitation Document. May also be referenced as “Bidder”, “Quoter” or “Proposer” based on the type of Solicitation Document.

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), labor rates and fringe benefits above the applicable prevailing wage and fringe benefit (if applicable, and if paid to or on behalf of the employee), Contractor’s labor burden for fringe benefit if paid to the employee, expenses of Contractor’s offices and supplies at the job site (e.g. job trailer) and at Contractor’s principal place of business and including expenses of personnel staffing the job site office and Contractor’s principal place of business, and Commercial General Liability Insurance and Automobile Liability Insurance.

OWNER, means, the Eastern Oregon University an Oregon public university. Owner may elect, by written notice to Contractor, to delegate certain duties to more than one party, including without limitation, to an Architect/Engineer. However, nothing in these Eastern Oregon University General Conditions is intended to abrogate the separate design professional responsibilities of Architects under ORS Chapter 671 or of Engineers under ORS Chapter 672 or any of their respective duties and obligation under any contracts with the Owner.

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

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

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

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

SOLICITATION DOCUMENT, means Instructions to Bidders or Offerors or a Request for Proposal or a Request for Quotes or any other written document issued by Owner that outlines the required Specifications necessary to submit a Bid, Proposal, or other response.

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 or indirect contract with the Contractor, or another Subcontractor of any tier, to perform one or more items of the Work or supply equipment and/or materials. For the avoidance of doubt the term Subcontractor includes sub-subcontractors and sub-suppliers of materials and equipment at all tiers.

SUBSTANTIAL COMPLETION, means the date when the Owner accepts in writing the construction, alteration or repair of the improvement to real property constituting the Work or any designated portion thereof as having reached that state of completion when it may be used or occupied for its intended purpose without unreasonable interruption. 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.3.2.

SUBSTITUTIONS, means items that in function, performance, reliability, quality, and general configuration are the same or better than the product(s) specified. Substitutions also means the performance of the Work by a labor force other than what is submitted in the Offer. Approval of any substitute item shall be solely determined by the Owner. The decision of the Owner is final.

PUBLIC IMPROVEMENT SUPPLEMENTAL GENERAL CONDITIONS, means those conditions that remove from, add to, or modify these Eastern Oregon University General Conditions. Public Improvement Supplemental General Conditions may be included in the Solicitation Document or may be a separate attachment to the Contract.

WORK, means the construction and 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, and reasonably inferable from, 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, and reasonably inferable from, 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) Eastern Oregon University General Conditions;
- (d) The Public Improvement Contract;
- (e) Division One (General Requirements) of the Specifications;
- (f) Detailed Schedules of finishes, equipment and other items included in the Specifications;
- (g) Plans and Specifications (other than Division One and the Detailed Schedules to the Specifications);
- (h) Large-scale drawings on Plans;
- (i) Small-scale drawings on Plans;
- (j) Dimension numbers written on Plans which shall prevail and take precedence over dimensions scaled from Plans;
- (k) The Solicitation Document, and any addenda thereto.

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

A.3.3 If the Contractor finds discrepancies in, or omissions from the Contract Documents, or if the Contractor is in doubt as to their meaning, the Contractor shall at once notify the Owner. Matters concerning and interpretation of requirements of the Contract Documents will be decided by the Owner, who may delegate that duty in some instances to the Architect/Engineer. Responses to Contractor's requests for interpretation of Contract Documents will be made in writing by Owner (or the Architect/Engineer) within any time limits agreed upon or otherwise with reasonable promptness. Interpretations and decisions of the Owner (or Architect/Engineer) will be consistent with the intent of and reasonably inferable from the Contract Documents. Contractor shall not proceed without direction in writing from the Owner (or Architect/Engineer).

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

A.4 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE

A.4.1 It is understood that the Contractor, before submitting an Offer, has made a careful examination of the Contract Documents; has become fully informed as to the quality and quantity of materials and the character of the Work required; and has made a careful examination of the location and conditions of the Work and the sources of supply for materials. The Owner will in no case be responsible for any loss or for any unanticipated costs that may be suffered by the Contractor as a result of the Contractor's failure to acquire full information in advance in regard to all conditions pertaining to the Work. No oral agreement or conversation with any officer, agent, or personnel of the Owner, or with the Architect/Engineer either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained. Contractor shall at all times be responsible for all utility locates regardless of the ownership of such utility infrastructure or service.

A.4.2 Should the Plans or Specifications fail to particularly describe the materials, kind of goods, or details of construction of any aspect of the Work, Contractor shall have the duty to make inquiry of the Owner and Architect/Engineer as to what is required prior to performance of the Work. Absent Specifications to the contrary, the materials or processes that would normally be used to produce first quality finished Work shall be considered a part of the Contract requirements.

A.4.3 Any design errors or omissions noted by the Contractor shall be reported promptly to the Owner, including without limitation, any nonconformity with Applicable Laws.

A.4.4 If the Contractor believes that adjustments to cost or Contract Time is involved because of clarifications or instructions issued by the Owner (or Architect/Engineer) in response to the Contractor's notices or requests for information, the Contractor must submit a written request to the Owner, setting forth the nature and specific extent of the request, including all time and cost impacts against the Contract as soon as possible, but no later than thirty (30) Days after receipt by Contractor of the clarifications or instructions issued. If the Owner denies Contractor's request for additional compensation, additional Contract Time, or other relief that Contractor believes results from the clarifications or instructions, the Contractor may proceed to file a Claim under Section D.3, Claims Review Process. If the Contractor fails to perform the obligations of Sections A.4.1 to A.4.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations.

A.4.5 Pursuant to ORS 352.138, the Owner, as a public university, is not subject to certain provisions of Oregon law, including certain provisions of the public contracting code. To the extent these General Conditions or other Contract Documents include certain of the provisions that are not applicable to public universities under ORS 352.138, those provisions nonetheless are part of the Contract and are enforceable against the Contractor to the extent they impose requirements or obligations on the Contractor.

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. Nothing contained in this Contract shall be deemed or construed to (1) make Contractor or any Subcontractor the agent, servant, or employee of the Owner, or (2) create any partnership, joint venture, or other association between Owner and Contractor or any Subcontractor.

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, state, county, and regional taxes (including but not limited to Oregon's corporate activity tax) 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 Owner or State of Oregon for purposes of performing Work under this Contract.

SECTION B

ADMINISTRATION OF THE CONTRACT

B.1 OWNER'S ADMINISTRATION OF THE CONTRACT

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

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

- B.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures.

- B.2.2 The Contractor is responsible to protect and maintain the Work during the course of construction and to mitigate any adverse impacts to the project, including those caused by authorized changes, which may affect cost, schedule, or quality.
- B.2.3 The Contractor is responsible for the actions and omissions (including but not limited to negligent acts and omissions) 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.2.4 Review or approval by Owner or its agents of Contractor's means, methods, techniques, procedures or submittals, or of any other aspect of Contractor's Work or services shall not relieve Contractor of its sole liability for any damages resulting from or arising out of defects or deficiencies in the Contractor's means, methods, techniques, procedures or submittals, or of any other aspect of Contractor's Work or services.

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 or non-conforming Work shall be corrected at the Contractor's expense.
- B.3.3 Work done and materials furnished may be subject to inspection and/or observation and testing by the Owner to determine if they conform to the Contract Documents. Inspection of the Work by the Owner does not relieve the Contractor of responsibility for the Work in accordance with the Contract Documents.
- B.3.4 Contractor shall furnish adequate facilities, as required, for the Owner to have safe access to the Work including without limitation walkways, railings, ladders, tunnels, and platforms. Producers, suppliers, and fabricators shall also provide proper facilities and access to their facilities.
- B.3.5 The Contractor shall furnish Samples of materials for testing by the Owner and include the cost of the Samples in the Contract Price.

B.4 PERMITS

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

B.5 COMPLIANCE WITH GOVERNMENT LAWS AND REGULATIONS

- B.5.1 Contractor shall comply with Applicable Laws pertaining to the Work and the Contract. Failure to comply with such requirements shall constitute a breach of Contract and shall be grounds for

Contract termination. Without limiting the generality of the foregoing, Contractor expressly agrees to comply with the following, as applicable:

(i) Title VI and VII of Civil Rights Act of 1964, as amended; (ii) Section 503 and 504 of the Rehabilitation Act of 1973, as amended; (iii) the Health Insurance Portability and Accountability Act of 1996; (iv) the Americans with Disabilities Act of 1990, as amended; (v) ORS Chapter 659A; as amended; (vi) all regulations and administrative rules established pursuant to the foregoing laws; and (vii) all other applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations.

B.5.2 Contractor shall comply with all applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations, and

(a) Contractor shall not discriminate against Disadvantaged, Minority, Women or Emerging Small Business enterprises, as those terms are defined in ORS 200.005, or a business enterprise that is owned or controlled by or that employs a disabled veteran, as that term is defined in ORS 408.225, in the awarding of subcontracts.

(b) Contractor shall maintain, in current and valid form, all licenses and certificates required by Applicable Laws or this Contract when performing the Work.

B.5.3 Unless contrary to federal law, Contractor shall certify that it shall not accept a bid from Subcontractors to perform Work as described in ORS 701.005 under this Contract unless such Subcontractors are registered with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 at the time they submit their bids to the Contractor.

B.5.4 Unless contrary to federal law, Contractor shall certify that each landscape contractor, as defined in ORS 671.520(2), performing Work under this Contract holds a valid landscape contractor's license issued pursuant to ORS 671.560.

B.5.5 The following notice is applicable to Contractors who perform excavation Work. ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center at (503) 232-1987.

B.5.6 Failure to comply with any or all of the requirements of B.5.1 through B.5.5 shall be a breach of Contract and constitute grounds for Contract termination. Damages or costs resulting from such noncompliance shall be the responsibility of Contractor.

B.6 SUPERINTENDENCE

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

B.7 INSPECTION

B.7.1 Owner shall have access to the Work at all times.

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

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

B.7.3 Contractor shall make or obtain at the appropriate time all tests, inspections and approvals of portions of the Work required by the Contract Documents or by Applicable Laws or orders of public authorities having jurisdiction. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work. The Contractor shall give the Owner timely notice of when and where tests and inspections are to be made so that the Owner may be present for such procedures. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Owner.

B.7.4 As required by the Contract Documents, Work done or material used without required inspection or testing and/or without providing timely notice to the Owner may be ordered removed at the Contractor's expense.

B.7.5 If directed to do so any time before the Work is accepted, the Contractor shall uncover portions of the completed Work for inspection. After inspection, the Contractor shall restore such portions of Work to the standard required by the Contract. If the Work uncovered is unacceptable or was done without required testing or inspection or sufficient notice to the Owner, the uncovering and restoration shall be done at the Contractor's expense. If the Work uncovered is acceptable and was done with sufficient notice to the Owner, the uncovering and restoration will be paid for pursuant to a 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 and Architect/Engineer's services and expenses, shall be at the Contractor's expense.

B.7.7 When the United States government participates in the cost of the Work, or the Owner has an agreement with other public or private organizations, or if any portion of the Work is being performed for a third party or in close proximity to third party facilities, representatives of these organizations shall have the right to inspect the Work affecting their interests or property. Their right to inspect shall not make them a party to the Contract and shall not interfere with the rights of the parties of the Contract. Instructions or orders of such parties shall be transmitted to the Contractor, through the Owner.

B.8 SEVERABILITY

If any provision of this Contract is declared by a court or arbitrator to be unenforceable, 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 access thereto.

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

B.10 WAIVER

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

B.11 SUBCONTRACTS AND ASSIGNMENT

- B.11.1 Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound by the terms and conditions of these Eastern Oregon University General Conditions, and to assume toward the Contractor all of the obligations and responsibilities which the Contractor assumes toward the Owner thereunder, unless 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. Contractor shall coordinate work with the Owner's other contractors or forces, cooperate with all other contractors or forces, carry out the Work in a way that will minimize interference and delay for all forces involved, place and dispose of materials being used so as not to interfere with the operations of another, and join the Work with the work of the others in an acceptable manner and perform it in proper sequence to that of the others. The Owner will resolve any disagreements that may arise between or among Contractor and the other contractors over the method or order of doing all work (including the Work). In case of unavoidable interference, the Owner will establish work priority (including the Work) which generally will be in the sequence that the contracts were awarded.

B.14 OTHER CONTRACTS

In all cases and at any time, the Owner has the right to execute other contracts related to or unrelated to the Work of this Contract. The Contractor of this Contract shall fully cooperate with any and all other contractors without additional cost to the Owner in the manner described in section B.13. The Contractor specifically acknowledges that the Owner's project to renovate Inlow Hall will occur concurrent with the Contractor's Work, and Contractor has fully taken into account the Inlow Hall renovation project in agreeing to its obligations in the Contract, including its obligations to coordinate its Work activities and schedule with the work activities and schedule of the contractor(s) performing the work on the Inlow Hall renovation project.

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 Union County for the State of Oregon; provided, however, (1) 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, or (2) if jurisdiction cannot be obtained over another person or entity involved in a common issue of law or fact in dispute, then at the Owner's election the Claim may be brought in any such court where jurisdiction may be obtained over such involved person or entity.. 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. The Contractor shall ensure a provision equivalent to this Section B.16 is included in all agreements with Subcontractors.

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 of 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 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 subsubcontractor), 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.

B.19 SUBSTITUTIONS

The Contractor may make Substitutions only with the consent of the Owner, after evaluation by the Owner and only in accordance with a 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

If Owner fails to receive funding, appropriations, allocations or other expenditure authority as contemplated by Owner's budget and Owner determines, in its assessment and ranking of the policy objectives explicit or implicit in Owner's budget, Owner may determine it is necessary to and may terminate the Public Improvement Contract.

B.22 NO THIRD PARTY BENEFICIARIES

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

SECTION C **WAGES AND LABOR**

C.1 MINIMUM WAGE RATES ON PUBLIC WORKS

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

C.2 PAYROLL CERTIFICATION AND FEE REQUIREMENTS

- C.2.1 In accordance with ORS 279C.845, the Contractor and every Subcontractor shall submit written certified statements to the Owner on the form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each worker which the Contractor or the Subcontractor has employed on the project and further certifying that no worker employed on the project has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the Contract, which certificate and statement shall be verified by the oath of the Contractor or the Subcontractor that the Contractor or Subcontractor has read the certified statement, that the Contractor or Subcontractor knows the contents of the

certified statement, and, that to the Contractor's or Subcontractor's best knowledge and belief, the certified statement is true. The certified statements shall set out accurately and completely the payroll records for the prior week, including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Certified statements for each week during which the Contractor or Subcontractor has employed a worker on the project shall be submitted once a month, by the fifth business day of the following month. The Contractor and Subcontractors shall preserve the certified statements for a period of ten (10) years from the date of completion of the Contract.

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

- C.2.3 Pursuant to ORS 279C.845(8), the Contractor shall retain 25 percent of any amount earned by a first-tier Subcontractor on this public works project until the first-tier Subcontractor has filed with the Owner the certified statements required by C.2.1. Before paying any amount retained under this subsection, the Contractor shall verify that the first-tier Subcontractor has filed the certified statement. Within 14 days after the first-tier Subcontractor files the required certified statement the Contractor shall pay the first-tier Subcontractor any amount retained under this subsection.

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

C.3 PROMPT PAYMENT AND CONTRACT CONDITIONS

- C.3.1 Pursuant to ORS 279C.505 and as a condition precedent 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.3.1.5 Demonstrate that an employee drug testing program is in place as follows:

- (a) Contractor represents and warrants that Contractor has in place at the time of the execution of this Contract, and shall

maintain during the term of this Contract, a Qualifying Employee Drug Testing Program for its employees that includes, at a minimum, the following:

- (1) A written employee drug testing policy,
- (2) Required drug testing for all new Subject Employees or, alternatively, required testing of all Subject Employees every 12 months on a random selection basis, and
- (3) Required testing of a Subject Employee when the Contractor has reasonable cause to believe the Subject Employee is under the influence of drugs.

(b) A drug testing program that meets the above requirements will be deemed a "Qualifying Employee Drug Testing Program." For the purposes of this section, an employee is a "Subject Employee" only if that employee will be working on the project job site. Contractor shall require each Subcontractor providing labor for the project to:

- (1) Demonstrate to the Contractor that it has a Qualifying Employee Drug Testing Program for the Subcontractor's Subject Employees,

and represent and warrant to the Contractor that the Qualifying Employee Drug Testing Program is in place at the time of subcontract execution and will continue in full force and effect for the duration of the subcontract, or

- (2) Require that the Subcontractor's Subject Employees participate in the Contractor's Qualifying Employee Drug Testing Program for the duration of the subcontract.

C.3.2 Pursuant to ORS 279C.515, and as a condition precedent to Owner's performance hereunder, Contractor agrees:

C.3.2.1 If Contractor fails, neglects or refuses to pay promptly a person's claim for labor or services that the person provides to the Contractor or a Subcontractor in connection with the project as such claim becomes due, the proper officer that represents the Owner may pay the amount of the claim and charge the amount of the payment against funds due or to become due Contractor under this Contract. Paying a claim in this manner shall not relieve the Contractor or the Contractor's surety from obligation with respect to an unpaid claim.

C.3.2.2 If the Contractor or a first-tier Subcontractor fails, neglects or refuses to pay a person that provides labor or materials in connection with the public contract for a public improvement within thirty (30) Days after receiving payment from Owner or a contractor, the contractor or first-tier Subcontractor owes the person the amount due plus interest charges that begin at the end of the 10-Day period within which payment is due under ORS 279C.580(3) and that end upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest on the amount due is nine percent per annum. The amount of interest may not be waived.

C.3.2.3 If the Contractor or a Subcontractor fails, neglects or refuses to pay a person that provides labor or materials in connection with the Contract, the person may file a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580. Every contract related to this Contract must contain a similar clause.

C.3.3 Pursuant to ORS 279C.580, Contractor shall include in each subcontract for property or services the Contractor enters into with a first-tier Subcontractor, including a material supplier, for the purpose of performing a construction contract:

(a) A payment clause that obligates the Contractor to pay the first-tier Subcontractor for satisfactory performance under the subcontract within ten (10) Days out of amounts the Owner pays to the Contractor under the Contract;

(b) A clause that requires the Contractor to provide the first-tier Subcontractor with a standard form that the first-tier Subcontractor may use as an application for payment or as another method by which the Subcontractor may claim a payment due from the Contractor;

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

- (1) Notifies the Subcontractor in writing at least

45 days before the date on which the Contractor makes the change; and

- (2) Includes with the written notice a copy of the new or changed form or a description of the new or changed procedure.

(d) An interest penalty clause that obligates the Contractor, if the Contractor does not pay the first-tier Subcontractor within thirty (30) Days after receiving payment from Owner, to pay the first-tier Subcontractor an interest penalty on amounts due in each payment the Contractor does not make in accordance with the payment clause included in the subcontract under paragraph (a) of this subsection. Contractor or first-tier Subcontractor is not obligated to pay an interest penalty if the only reason that the Contractor or first-tier Subcontractor did not make payment when payment was due is that the Contractor or first-tier Subcontractor did not receive payment from Owner or Contractor when payment was due. The interest penalty applies to the period that begins on the day after the required payment date and that ends on the date on which the amount due is paid; and is computed at the rate specified in ORS 279C.515(2).

(e) A clause which requires each of Contractor's Subcontractors to include, in each of their contracts with lower-tier Subcontractors or suppliers, provisions to the effect that the first-tier Subcontractor shall pay its lower-tier Subcontractors and suppliers in accordance with the provisions of paragraphs (a) through (d) above and requiring each of their Subcontractors and suppliers to include such clauses in their subcontracts and supply contracts.

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

Pursuant to ORS 279C.530, and as a condition precedent 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 precedent to Owner's performance hereunder, Contractor shall comply with ORS 279C.520, as amended from time to time and incorporated herein by this reference: no person shall be employed to perform Work under this Contract for more than ten (10) hours in any one day or forty (40) hours in any one week, except in cases of necessity, emergency or where public policy absolutely requires it. In such instances, Contractor shall pay the employee at least time and a half pay:

- (a) For all overtime in excess of eight (8) hours a day or forty (40) hours in any one week when the work week is five consecutive Days, Monday through Friday; or
- (b) For all overtime in excess of ten (10) hours a day or forty (40) hours in any one week when the work week is four consecutive Days, Monday through Friday; and
- (c) For all Work performed on Saturday and on any legal holiday specified in ORS 279C.540.

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

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

SECTION D **CHANGES IN THE WORK**

D.1 CHANGES IN WORK

D.1.1 The terms of this Contract shall not be waived, altered, modified, supplemented or amended in any manner whatsoever, without prior written agreement and then only after any necessary approvals have been obtained. A Change Order 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, Specifications, quantities, or details of construction are inherent in the nature of construction and may be necessary or desirable during the course of construction. Within the general scope of this Contract, the Owner may at any time, without notice to the sureties and without impairing the Contract, require changes consistent with this Section D.1. All changes to the Work shall be documented and Change Orders shall be executed under the conditions of the Contract Documents. Such changes may include, but are not limited to:

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

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

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

- (a) Unit Pricing: Unit pricing may be utilized at the Owner's option when unit prices or solicitation alternates were provided that

established the cost for adjustments to Work, and a binding obligation exists under the Contract on the parties covering the terms and conditions of the adjustment to Work.

- (b) Fixed Fee: If the Owner elects not to utilize unit pricing, or in the event that unit pricing is not available or appropriate, fixed pricing may be used for adjustments to or deletions from the Work. In fixed pricing the basis of payments or total price shall be agreed upon in writing between the parties to the Contract, and shall be established before the Work is done whenever feasible. Notwithstanding the foregoing, the mark-ups set forth in D.1.3(c) shall be utilized in establishing fixed pricing, and such mark-ups shall not be exceeded. Cost and price data relating to adjustments to or deletions from the Work shall be supplied by Contractor to Owner upon request, but Owner shall be under no obligation to make such requests.
- (c) Time and Material: In the event that unit pricing and fixed pricing are not utilized, then adjustments to or deletions from the Work shall be performed on a cost reimbursement basis for Direct Costs. Such Work shall be compensated on the basis of the actual, reasonable and allowable cost of labor, equipment, and material furnished on the Work performed. The Contractor or Subcontractor who performs the Work shall be allowed to add up to ten percent (10%) markup to the Direct Costs as full compensation for profit, Overhead and other indirect costs for Work performed with the Contractor's or Subcontractor's own forces

Each ascending tier Subcontractor or the Contractor that did not perform the Work, will be allowed to add up to five percent (5%) supplemental markup on the Direct Costs of the Work (but not the above allowable markups) covered by a Change Order. No additional markup shall be permitted for any third tier or greater descending Subcontractor.

Example: \$20,000 of Direct Costs Work performed by a 2nd Tier Subcontractor

	Markup	Allowed Total Fee Plus Markup
General Contractor	5%	\$1,000.00
1 st Tier Sub Contractor	5%	\$1,000.00
2 nd Tier Sub Contractor	10%	\$22,000.00

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

- D.1.4 Any necessary adjustment of Contract Time that may be required as a result of adjustments to or deletions from the Work must be agreed upon by the parties before the start of the revised Work unless Owner authorizes Contractor to start the revised Work before agreement on Contract Time adjustment.

Contractor shall submit any request for additional compensation (and additional Contract Time if Contractor was authorized to start Work before an adjustment of Contract Time was approved) as soon as possible but no later than thirty (30) Days after receipt of Owner's request for additional Work. If Contractor's request for additional compensation or adjustment of Contract Time is not

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

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

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

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

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

- D.1.7 It is understood that changes in the Work are inherent in construction of this type. The number of changes, the scope of those changes, and the effect they have on the progress of the original Work cannot be defined at the time of execution of the Contract. The Contractor is notified that numerous changes may

be required and that there will be no compensation made, unless and only to the extent otherwise provided in the Contract Documents, to the Contractor directly or indirectly 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.1.8 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 additional 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, Contractor shall proceed with the Work while any request or Claim is pending, including but not limited to, a request or Claim for additional compensation or additional Contract Time resulting from Work under a Change Order or Construction Change Directive. Regardless of the review period or the final decision of the Owner, the Contractor shall continue to diligently pursue the Work as identified in the Contract Documents. In no case is the Contractor justified or allowed to cease Work without a written stop work order from the Owner.

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; or
- (b) Affect only a portion of the Work and do not necessarily prevent or delay the prosecution of other parts of the Work nor the completion of the whole Work within the Contract Time; or
- (c) Do not impact activities on the accepted critical path schedule; or
- (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, 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 immediately of differing site conditions before the area has been disturbed. The Owner will investigate the area and make a determination as to whether or not the conditions

differ materially from either the conditions stated in the Contract Documents or those which could reasonably be expected in execution of this particular Contract. If Contractor and the Owner agrees that a differing site condition exists, any adjustment to compensation or Contract Time will be determined based on the process set forth in Section D.1.5 for adjustments to or deletions from Work. If the Owner disagrees that a differing site condition exists and denies Contractor's request for additional compensation or Contract Time, Contractor may proceed to file a Claim under Section D.3, Claims Review Process.

- (c) Caused by Force Majeure acts, events or occurrences that could not have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its Subcontractors.
- (d) To the extent caused by adverse weather conditions not reasonably anticipatable. 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 reasonably anticipated by the Contractor, and adversely impacted the project in a manner that could not be avoided by rescheduling the Work or by implementing measures to protect against the weather so that the Work could proceed. A rain, windstorm, high water, or other natural phenomenon for the specific locality of the Work, which might reasonably have been anticipated from the previous 10-year historical records of the general locality of the Work, shall not be construed as abnormal. The parties agree that rainfall greater than the following levels cannot be reasonably anticipated:

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

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

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

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

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

In the event of any requests for additional compensation or additional Contract Time, or both, as applicable, arising under this Section D.2.3 for Unavoidable Delays, other than requests for additional compensation or additional Contract Time for differing site conditions for which a review process is established under

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

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

D.3 CLAIMS REVIEW PROCESS

D.3.1 All Contractor Claims shall be referred to the Owner for review. Contractor's Claims, including Claims for adjustments to compensation or Contract Time, shall be submitted in writing by Contractor to the Owner within five (5) Days after a denial of Contractor's initial request for an adjustment of Contract terms, payment of money, extension of Contract Time or other relief, provided that such initial request has been submitted in accordance with the requirements and within the time limits established in these Eastern Oregon University General Conditions. Within thirty (30) Days after the initial Claim, Contractor shall submit to the Owner a complete and detailed description of the Claim (the "Detailed Notice") that includes all information required by Section D.3.2. Unless the Claim by Contractor is made in accordance with the time and procedural requirements in these General Conditions, it shall be deemed 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 adjustment requested for the Claim. If the Claim involves Work to be completed by Subcontractors, the Contractor will analyze and evaluate the merits of the Subcontractor claim prior to forwarding it and that analysis and evaluation to the Owner. The Owner will not consider direct claims from Subcontractors, suppliers, manufacturers, or others not a party to this Contract. Contractor agrees that it will make no agreement, covenant, or assignment, nor will it commit any other act that will permit or assist any Subcontractor, supplier, manufacturer, or other to directly or indirectly make a claim against Owner.

D.3.3 The Owner will review all Claims and may take one or more of the following preliminary actions within ten (10) Days of receipt of the Detailed Notice of a Claim: (1) request additional supporting information from the Contractor; (2) inform the Contractor and Owner in writing of the time required for adequate review and response; (3) reject the Claim in whole or in part and identify the reasons for rejection; (4) based on principles of equitable adjustment, recommend approval of all or part of the Claim; or (5) propose an alternate resolution.

D.3.4 The Owner's decision shall be final and binding on the Contractor unless appealed by written notice to the Owner within fifteen (15)

Days of receipt of the decision. The Contractor must present written documentation supporting the Claim within fifteen (15) Days of the notice of appeal. After receiving the appeal documentation, the Owner shall review the materials and render a decision within thirty (30) Days after receiving the appeal documents.

D.3.5 The decision of the Owner shall be final and binding unless the Contractor delivers to the Owner its request for mediation, which shall be a non-binding process, within fifteen (15) Days of the date of the Owner's decision. The mediation process will be considered to have commenced as of the date the Contractor delivers the request. Both parties acknowledge and agree that participation in mediation is a prerequisite to commencement of litigation of any disputes relating to the Contract. Both parties further agree to exercise their best efforts in good faith to resolve all disputes within sixty (60) Days of the commencement of the mediation through the mediation process set forth herein.

In the event that a lawsuit must be filed within this sixty (60) Day period in order to preserve a cause of action, the parties agree that, notwithstanding the filing, they shall proceed diligently with the mediation to its conclusion prior to actively prosecuting the lawsuit, and shall seek from the Court in which the lawsuit is pending such stays or extensions, including the filing of an answer, as may be necessary to facilitate the mediation process. Further, in the event settlements are reached on any issues through mediation, the plaintiff shall promptly cause to be entered by the Court a stipulated general judgment of dismissal with prejudice, or other appropriate order limiting the scope of litigation as provided in the settlement.

D.3.6 Should the parties arrive at an impasse regarding any Claims or disputed Claims, it is agreed that the parties shall participate in mediation as specified in Section D.3.5. The mediation process will be considered to have been commenced as of the date one party delivers to the other its request in writing to mediate. The mediator shall be an individual mutually acceptable to both parties, but in the absence of agreement each party shall select a temporary mediator and the temporary mediators shall jointly select the permanent mediator. Each party shall pay its own costs for the time and effort involved in mediation. The cost of the mediator shall be split equally between the two parties. Both parties agree to exercise their best effort in good faith to resolve all disputes in mediation. Participation in mediation is a mandatory requirement of both the Owner and the Contractor. The schedule, time and place for mediation will be mutually acceptable, or, failing mutual agreement, shall be as established by the mediator. The parties agree to comply with Owner's administrative rules governing the confidentiality of mediation, if any, and shall execute all necessary documents to give effect to such confidentiality rules. In any event, the parties shall not subpoena the mediator or otherwise require the mediator to produce records, notes or work product, or to testify in any future proceedings as to information disclosed or representations made in the course of mediation, except to the extent disclosure is required by law.

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

D.3.8 Should any suit, action or arbitration be commenced in connection with any dispute arising out of this Contract, the prevailing party shall be entitled to recover its costs and disbursements, investigation costs and fees, expert witness costs and fees, and attorney costs and fees, as the court or arbitrator may adjudge reasonable, incurred in connection with such dispute before trial or arbitration, at trial or arbitration, upon any motion for reconsideration, upon any appeal or petition for review, and upon any collection efforts or proceedings.

SECTION E PAYMENTS

E.1 SCHEDULE OF VALUES

The Contractor shall submit, by or before the pre-construction conference, a schedule of values ("Schedule of Values") for the contracted Work. This schedule shall provide a breakdown of values for the contracted Work and will be the basis for progress payments. The breakdown shall demonstrate reasonable, identifiable, and measurable components of the Work. Unless objected to by the Owner, this schedule shall be used as the basis for reviewing Contractor's applications for payment. If objected to by Owner, Contractor shall revise the schedule of values and resubmit the same for approval of Owner.

E.2 APPLICATIONS FOR PAYMENT

E.2.1 Owner shall make progress payments on the Contract monthly as Work progresses, in accordance with the requirements of this Section E.2. Applications for payment shall be based upon estimates of Work completed and the Schedule of Values. As a condition precedent to Owner's obligation to pay, all applications for payment shall be approved by the Owner. A progress payment shall not be considered acceptance or approval of any Work or waiver of any defects therein. Owner shall pay to Contractor interest for overdue invoices at the rate of two thirds of one percent per month on the progress payment, not including retainage, due the Contractor. Overdue invoices will be those that have not been paid within fourteen (14) days from the date of the receipt of the accurate invoice.

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 ten (10) Days stating the reason or reasons the application for payment is defective or improper or the reasons for the dispute.

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

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

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

face of each copy thereof, a certificate in substantially the following form:

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

Signed: _____
Dated: _____"

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

- (a) The request for stored material shall be submitted at least thirty (30) Days in advance of the application for payment on which it appears. Applications for payment shall be entertained for major equipment, components or expenditures only.
- (b) The Contractor shall submit applications for payment showing the quantity and cost of the material stored.
- (c) The material shall be stored in a bonded warehouse and Owner shall be granted the right to access the material for the purpose of removal or inspection at any time during the Contract Period.
- (d) The Contractor shall name the Owner as co-insured on the insurance policy covering the full value of the property while in the care and custody of the Contractor until it is installed. A certificate noting this coverage shall be issued to the Owner.
- (e) Payments shall be made for materials and equipment only. The submitted amount in the application for payment shall be reduced by the cost of transportation from the storage site to the project site and for the cost of an inspector to verify delivery and condition of the goods at the storage site. The cost of storage and inspection shall be borne solely by the Contractor.
- (f) Within sixty (60) Days of the application for payment, the Contractor shall submit evidence of payment covering the material and/or equipment stored and of payment for the storage site.
- (g) Payment for stored materials and/or equipment shall in no way indicate acceptance of the materials and/or equipment or waive any rights under this Contract for the rejection of the Work or materials and/or equipment that are defective or not in conformance with the Contract Documents.
- (h) All required documentation shall be submitted with the respective application for payment.

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

- (a) Work that is defective or non-conforming and not remedied, or that has been demonstrated or identified as failing to conform with Applicable Laws or the Contract Documents,
- (b) third party claims filed or evidence reasonably indicating that such claims will likely be filed unless security acceptable to the Owner is provided by the Contractor;

- (c) failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment (in which case Owner may issue checks made payable jointly to Contractor and such unpaid persons under this provision, or directly to Subcontractors and suppliers at any level under Section C.3.2.1);
- (d) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price;
- (e) damage to the Work, Owner or another contractor;
- (f) reasonable evidence that the Work will not be completed within the Contract Time required by the Contract, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- (g) failure to carry out the Work in accordance with the Contract Documents; or
- (h) assessment of liquidated damages, when withholding is made for offset purposes.

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

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

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

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

E.2.8 If Contractor disputes any determination by Owner with regard to any application for payment, Contractor nevertheless shall continue to expeditiously perform the Work. No payment made hereunder

shall be or be construed to be final acceptance or approval of that portion of the Work to which such partial payment relates or shall relieve Contractor of any of its obligations hereunder.

E.2.9 Contractor shall submit its initial D/M/W/ESB/SDVBE 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 D/M/W/ESB/SDVBE 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 D/M/W/ESB/SDVBE Report otherwise due on that June 30. The final D/M/W/ESB/SDVBE Report shall be filed with the application for final payment. Timely receipt of D/M/W/ESB/SDVBE Reports by Owner shall be a condition precedent to Owner's obligation to pay any progress payments or final payment otherwise due.

E.3 PAYROLL CERTIFICATION REQUIREMENT

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

E.4 DUAL PAYMENT SOURCES

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

E.5 RETAINAGE

E.5.1 Retainage shall be withheld and released in accordance with the requirements set forth in OAR 580-063-0045, or the applicable Eastern Oregon University standard.

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

E.5.1.2 If the Contract Price exceeds \$500,000, the Owner shall place amounts withheld as retainage into an interest-bearing escrow account pursuant to ORS 701.420(2)(b).

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 one percent per month on the final payment due Contractor, interest to commence thirty (30) Days after the date which Owner receives Contractor's final approved application for payment and Work under the Contract has been completed and accepted and to run until the date when final payment is tendered to Contractor. The Contractor shall notify Owner in writing when the

Contractor considers the Work complete and deliver to Owner its final application for payment and Owner shall, within fifteen (15) Days after receiving the written notice and the application for payment, either accept the Work or notify the Contractor of Work yet to be performed on the Contract. If Owner does not within the time allowed notify the Contractor of Work yet to be performed to fulfill contractual obligations, the interest provided by this subsection shall commence to run thirty (30) Days after the end of the 15 Day period.

E.5.1.4

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, in writing, that Contractor has completed Contractor's obligations under the Contract and shall prepare its application requesting final payment. Upon receipt of such notice and application for payment, the Owner will inspect the Work, and, if acceptable, submit to Contractor a recommendation as to acceptance of the completed Work and the final estimate of the amount due the Contractor. If the Work is not acceptable, Owner will notify Contractor within fifteen (15) Days of Contractor's request for final payment. Upon approval of this final application for payment by the Owner and compliance by the Contractor with provisions in Section K, and Contractor's satisfaction of other provisions of the Contract Documents as may be applicable, the Owner shall pay to the Contractor all monies due under the provisions of these Contract Documents.

E.6.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Owner (1) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least thirty (30) Days' prior written notice has been given to the Owner, (2) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (3) consent of surety, if any, to final payment and (4), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees. References to liens and lien waivers in these General Conditions shall not be construed as Owner's concession that such liens are valid under Oregon law.

E.6.3 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final application for payment.

E.6.4 Contractor agrees to submit its final payment application within ninety (90) Days after Substantial Completion, unless written extension is granted by Owner. Contractor shall not delay final payment application for any reason, including without limitation nonpayment of Subcontractors, suppliers, manufacturers or others not a party to this Contract, or lack of resolution of a dispute with Owner or any other person of matters arising out of or relating to the Contract. If Contractor fails to submit its final payment application within ninety (90) Days after Substantial Completion, and Contractor has not obtained written extension by Owner, all requests or Claims for additional costs or an extension of Contract Time shall be waived.

**SECTION F
JOB SITE CONDITIONS**

F.1 USE OF PREMISES

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

F.2 PROTECTION OF WORKERS, PROPERTY AND THE PUBLIC

F.2.1 Contractor shall maintain continuous and adequate protection of all of the Work from damage and shall protect the Owner, workers and property from injury or loss arising in connection with this Contract. Contractor shall remedy acceptably to the Owner any damage, injury, or loss, except such as may be directly due to errors in the Contract Documents or caused by authorized representatives or personnel of the Owner. Contractor shall adequately protect adjacent property as provided by law and the Contract Documents.

F.2.2 Contractor shall take all necessary precautions for the safety of all personnel on the job site or otherwise engaged in the undertaking of the Work and shall comply with the Contract Documents, best practices and all applicable provisions of federal, state and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the Work is being performed. Contractor shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards for protection of workers and the public against any hazards created by construction. Contractor shall designate a responsible employee or associate on the Work site, whose duty shall be the prevention of accidents. The name and position of the person designated shall be reported to the Owner. The Owner has no responsibility for Work site safety. Work site safety shall be the responsibility of the Contractor.

F.2.3 Contractor shall not enter upon private property without first obtaining permission from the property owner or its duly authorized representative. Contractor shall be responsible for the preservation of all public and private property along and adjacent to the Work contemplated under the Contract and shall use every precaution necessary to prevent damage thereto. In the event the Contractor damages any property, the Contractor shall at once notify the property owner and make, or arrange to make, full restitution. Contractor shall, immediately and in writing, report to

the Owner, all pertinent facts relating to such property damage and the ultimate disposition of the claim for damage.

- F.2.4 Contractor shall be responsible for protection of adjacent work areas including impacts brought about by activities, equipment, labor, utilities, vehicles and materials on the site.
- F.2.5 Contractor shall at all times direct its activities in such a manner as to minimize adverse effects on the environment. Handling of all materials shall be conducted so no release will occur that may pollute or become hazardous.
- F.2.6 In an emergency affecting the safety of life or limb or of the Work or of adjoining property, the Contractor, without special instruction or authorization from the Owner, shall act reasonably to prevent threatened loss or injury, and shall so act, without appeal, if instructed by the Owner. Any compensation claimed by the Contractor on account of emergency work shall be determined in accordance with section D.
- F.2.7 Contractor shall comply with all Owner safety rules and regulations. Prior to commencement of any Work, Contractor shall be required to complete an Owner Contractor Safety Orientation and submit all Owner required safety plans.

F.3 CUTTING AND PATCHING

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

F.4 CLEANING UP

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

F.5 ENVIRONMENTAL CONTAMINATION

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

- F.5.1.1 Contractor agrees to promptly dispose of such spills, releases, discharge or leaks to the satisfaction of Owner and regulatory agencies having jurisdiction in a manner that complies with Applicable Laws. Cleanup shall be at no cost to the Owner and shall be performed by properly qualified and, if applicable, licensed personnel.
- F.5.1.2 Contractor shall obtain the Owner's written consent prior to bringing onto the Work site any (i) environmental pollutants or (ii) hazardous substances or materials, as the same or reasonably similar terms are used in any Applicable Laws. Notwithstanding such written consent from the Owner, the Contractor, at all times, shall:
- (a) properly handle, use and dispose of all environmental pollutants and hazardous substances or materials brought onto the Work site, in accordance with all Applicable Laws;
 - (b) be responsible for any and all spills, releases, discharges, or leaks of (or from) environmental pollutants or hazardous substances or materials which Contractor has brought onto the Work site; and
 - (c) promptly clean up and remediate, without cost to the Owner, such spills, releases, discharges, or leaks to the Owner's satisfaction and in compliance with all Applicable Laws.
- F.5.2 Contractor shall report all reportable quantity releases, as such releases are defined in Applicable Laws, including but not limited to 40 CFR Part 302, Table 302.4 and in OAR 340-142-0050, to applicable federal, state, and local regulatory and emergency response agencies. Upon discovery, regardless of quantity, Contractor must telephonically report all releases to the Owner. A written follow-up report shall be submitted to Owner within 48 hours of the telephonic report. Such written report shall contain, as a minimum:
- (a) Description of items released (identity, quantity, manifest numbers, and any and all other documentation required by law.)
 - (b) Whether amount of items released is EPA/DEQ reportable, and, if so, when reported.
 - (c) Exact time and location of release, including a description of the area involved.
 - (d) Containment procedures initiated.
 - (e) Summary of communications about the release between Contractor and members of the press or State, local or federal officials other than Owner.
 - (f) Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.
 - (g) Personal injuries, if any, resulting from, or aggravated by, the release.

F.6 ENVIRONMENTAL CLEAN-UP

- F.6.1 Unless disposition of environmental pollution is specifically a part of this Contract, or was caused by the Contractor (reference F.5 Environmental Contamination), Contractor shall immediately notify Owner of any hazardous substance(s) which Contractor

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

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

F.7 FORCE MAJEURE

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

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

G.1 RESPONSIBILITY FOR DAMAGES / INDEMNITY

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

- G.1.2 To the fullest extent permitted by law, the Contractor shall indemnify, hold harmless, reimburse and defend (with counsel approved by Owner) the Owner and Owner's agents, employees, officers and directors from, for, and against suits, actions, awards, penalties, liabilities, claims, damages, losses and expenses, whether actual or merely alleged and whether directly incurred or from a third party, including but not limited to attorneys' and expert witnesses' fees, and related costs, disbursements, and expenses, arising out of or resulting from performance of the Work including, but not limited to, any such suit, action award, penalty, liability, claim, damage, loss, or expense attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, but only to the extent caused by the negligence, breach of contract, or other wrongful acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they are responsible, or by failure of any such person or entity to perform as required by this Agreement.

- G.1.3 To the fullest extent permitted by law, in claims against any person or entity indemnified under Section G.1.2 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section G.1.2 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for

the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

G.2 PERFORMANCE AND PAYMENT SECURITY; PUBLIC WORKS BOND

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

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

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

G.3 INSURANCE

- G.3.1 Contractor shall comply and shall require Subcontractors to comply with the Insurance Requirements in Exhibit A.

SECTION H **SCHEDULE OF WORK**

H.1 CONTRACT PERIOD

- H.1.1 Time is of the essence of the Contractor's performance under the Contract. The Contractor shall at all times carry on the Work diligently, without delay and punctually fulfill all requirements herein. If required by the Contract Documents, Contractor shall commence Work on the site within fifteen (15) Days of Notice to Proceed, unless directed otherwise.

- H.1.2 Unless specifically extended by a 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 provisions of Section D.1.

- H.1.3 The Owner shall not waive any rights under the Contract by permitting the Contractor to continue or complete in whole or in part the Work after the date described in Section H.1.2 above.

H.2 SCHEDULE

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

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

H.2.2 All Work shall be completed during normal weekdays (Monday through Friday) between the hours of 7:00 a.m. and 5:00 p.m. unless otherwise specified in the Contract Documents. Unless otherwise specified in the Contract Documents, no Work shall be performed during the following holidays:

- New Year's Day
- Martin Luther King Day
- Memorial Day
- Independence Day
- Labor Day
- Veterans Day
- Thanksgiving Day
- Christmas Day

When a holiday falls on a Sunday, the following Monday shall be recognized as a legal holiday. When a holiday falls on Saturday, the preceding Friday shall be recognized as a legal holiday.

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 or non-conforming. Contractor shall promptly remove from the premises and replace all defective or non-conforming materials and equipment as determined by the Owner, whether incorporated in the Work or not. Removal and replacement shall be without loss or expense to the Owner, and Contractor shall bear the cost of repairing all Work destroyed or damaged by such removal or replacement. Contractor shall be allowed a period of no longer than thirty (30) Days after Substantial Completion for completion of defective or non-conforming (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 or non-conforming 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. The Owner shall give Contractor notice of defects with reasonable promptness. Contractor shall perform such corrective work within a reasonable time after Owner's demand. If Contractor fails to complete the corrective work within such period as Owner determines reasonable, or at any time in the event of corrective work consisting of emergency repairs, Owner may perform such work and Contractor shall reimburse Owner all costs of the same within ten (10) Days after demand, without affecting Contractor's obligations. The Contractor shall perform the warranty Work by correcting defects within twenty-four (24) hours of notification by Owner, unless otherwise specified in the Contract Documents. Should the Contractor fail to respond within the specified response time, the Owner may, at its option, complete the necessary repairs using another contractor or its own forces. If Owner completes the repairs using Owner's own forces, Contractor shall pay Owner at the rate of one and one-half (1½) times the standard hourly rate of Owner's forces, plus related overhead and any direct non-salary costs. If Owner completes the repairs using another contractor, Contractor shall pay Owner the amount of Owner's direct costs billed by the other contractor for the work, plus the direct salary costs and related overhead and direct non-salary expenses of Owner's forces who are required to monitor that contractor's work. Work performed by Owner using Owner's own forces or those of another contractor shall not affect the Contractor's contractual duties under these provisions, including warranty provisions.

I.2.2 Nothing in this Section I.2 provision shall limit or negate Contractor's obligation to perform the Work in accordance with the Contract Documents (or time limitations for Owner's enforcement of those obligations), guarantees or warranties for periods longer than one year including without limitation, such guarantees or warranties required by other sections of the Contract Documents

for specific installations, materials, processes, equipment or fixtures.

- I.2.3 In addition to Contractor's warranty, manufacturer's warranties shall pass to the Owner and shall not take effect until such portion of the Work covered by the applicable warranty has been accepted in writing by the Owner.
- I.2.4 The one-year period for correction of Work shall be extended with respect to portions of Work performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work, and shall be extended by corrective Work performed by the Contractor pursuant to this Section, as to the Work corrected. The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.
- I.2.5 Nothing contained in this Section I.2 shall be construed to establish a period of limitation or repose with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the period for correction of Work as described in this Section I.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.
- I.2.6 If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Price will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

SECTION J

SUSPENSION AND/OR TERMINATION OF THE WORK

J.1 OWNER'S RIGHT TO SUSPEND THE WORK

- J.1.1 The Owner has the authority to suspend portions or all of the Work due to the following causes:
- (a) Failure of the Contractor to correct unsafe conditions;
 - (b) Failure of the Contractor to carry out any provision of the Contract;
 - (c) Failure of the Contractor to carry out orders;
 - (d) Conditions, in the opinion of the Owner, which are unsuitable for performing the Work;
 - (e) Time required to investigate differing site conditions;
 - (f) Any reason considered to be in the public interest.
- J.1.2 The Owner shall notify Contractor and the Contractor's Surety in writing of the effective date and time of the suspension, and Owner shall notify Contractor and Contractor's surety in writing to resume Work.

J.2 CONTRACTOR'S RESPONSIBILITIES

- J.2.1 During the period of the suspension, Contractor is responsible to continue maintenance at the project just as if the Work were in progress. This includes, but is not limited to, protection of completed Work, maintenance of access, protection of stored materials, temporary facilities, and clean-up.
- J.2.2 When the Work is recommenced after the suspension, the Contractor shall replace or renew any Work damaged during the suspension, remove any materials or facilities used as part of temporary maintenance, and complete the Work in every respect as though its prosecution had been continuous and without suspension.

J.3 COMPENSATION FOR SUSPENSION

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

J.4 OWNER'S RIGHT TO TERMINATE CONTRACT

- J.4.1 The Owner may, without prejudice to any other right or remedy, and after giving Contractor seven (7) Days' written notice and an opportunity to cure, terminate the Contract in whole or in part under the following conditions:
- (a) If Contractor should, voluntarily or involuntarily, seek protection under the United States Bankruptcy Code and Contractor as debtor-in-possession or the Trustee for the estate fails to assume the Contract within a reasonable time;
 - (b) If Contractor should make a general assignment for the benefit of Contractor's creditors;
 - (c) If a receiver should be appointed on account of Contractor's insolvency;
 - (d) If Contractor should repeatedly refuse or fail to supply an adequate number of skilled workers or proper materials to carry on the Work as required by the Contract Documents, or otherwise fail to perform the Work in a timely manner;
 - (e) If Contractor should repeatedly fail to make prompt payment to Subcontractors or for material or labor, or should disregard laws, ordinances or the instructions of the Owner; or
 - (f) If Contractor is otherwise in breach of any part of the Contract.
 - (g) If Contractor is in violation of Applicable Laws, either in the conduct of its business or in its performance of the Work.

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

the Owner's cost of finishing the Work exceeds the unpaid balance of the Contract Price, Contractor shall pay the difference to the Owner.

J.5 TERMINATION FOR CONVENIENCE

- J.5.1 Owner may terminate the Contract for Owner's convenience in whole or in part whenever Owner determines, in the Owner's sole discretion, that termination of the Contract is in the best interest of Owner and/or the public.
- J.5.2 The Owner shall provide the Contractor with seven (7) Days prior written notice of a termination for Owner's 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.
- J.6.3 Upon Owner's notice of termination pursuant to either Section J.4 or J.5, if Owner shall so elect, Contractor shall assign to the Owner such subcontracts and orders as Owner shall specify. In the event Owner elects to take assignment of any such subcontract or order, Contractor shall take such action and shall execute such documents as Owner shall reasonably require for the effectiveness of such assignment and Contractor shall ensure that no contractual arrangement between it and its subcontractors or suppliers of any tier or sub-tier shall prevent such assignment.

SECTION K **CONTRACT CLOSE OUT**

K.1 RECORD DOCUMENTS

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

K.2 OPERATION AND MAINTENANCE MANUALS

As part of the Work, Contractor shall submit two completed operation and maintenance manuals ("O & M Manuals") for review by the Owner prior to submission of any pay request for more than 75% of the Work. Owner's receipt of the O & M Manuals shall be a condition precedent to

any payment thereafter due. The O & M Manuals shall contain a complete set of all submittals, all product data as required by the specifications, training information, telephone list and contact information for all consultants, manufacturers, installer and suppliers, manufacturer's printed data, record and shop drawings, schematic diagrams of systems, appropriate equipment indices, warranties and bonds. The Owner shall review and return one O & M Manual for any modifications or adjustments required. Prior to submission of its final pay request, Contractor shall deliver two (2) complete and approved sets of O & M Manuals in paper form and one (1) complete and approved set in electronic form to the Owner and Owner's receipt of the O & M Manuals shall be a condition precedent to Owner's obligation to make final payment.

K.3 COMPLETION NOTICES

- K.3.1 Contractor shall provide Owner written notice of both Substantial and Final Completion. The certificate of Substantial Completion shall state the date of Substantial Completion, the responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and the time within which the Contractor shall finish all items on the Punch List accompanying the Certificate. Both completion notices must be signed and notarized by the Contractor and signed by the Architect/Engineer (if applicable) and Owner to be valid. The Owner shall provide the final signature on the notices. The notices shall take effect on the date they are signed by the Owner.
- K.3.2 Substantial Completion of a facility with operating systems (e.g., mechanical, electrical, HVAC) shall be that degree of completion that has provided a minimum of thirty (30) continuous Days of successful, trouble-free operation, which period shall begin after all performance and acceptance testing has been successfully demonstrated to the Owner. All equipment contained in the Work, plus all other components necessary to enable the Owner to operate the facility in the manner that was intended, shall be complete on the Substantial Completion date. The Contractor may request that a Punch List be prepared by the Owner with submission of the request for the Substantial Completion notice.

K.4 TRAINING

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

K.5 EXTRA MATERIALS

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

K.6 ENVIRONMENTAL CLEAN-UP

As part of the Final Completion notice, or as a separate written notice submitted with or before the notice of Final Completion, the Contractor shall notify the Owner that all environmental and pollution clean-up, remediation and closure have been completed in accordance with all Applicable Laws and pursuant to the authority of all agencies having

jurisdiction, and Contractor shall provide Owner with any and all documentation related to the same, including but not limited to directives, orders, letters, certificates and permits related to or arising from such environmental pollution. The notice shall reaffirm the indemnification given under Section F.5.1 above. Contractor's completion of its obligations under this Section K.6 and Owner's receipt of documents evidencing such completion shall be a condition precedent to Owner's obligation to make final payment.

K.7 CERTIFICATE OF OCCUPANCY

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

K.8 OTHER CONTRACTOR RESPONSIBILITIES

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

The Owner's property is tobacco free, drug free, and weapons free areas. Contractor shall be required to ensure that its employees, Subcontractors and agents shall comply with the Owner Drug, Tobacco and Weapon Free Campus policies, hereby incorporated by reference.

K.9 SURVIVAL

Without limiting the survivability of any other provision of the Contract, that by its nature survives termination, all corrective obligations, 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.

SECTION 01 10 00
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY OF WORK

- A. The work under this contract consists demolition, removal, and grading. Scope of work includes the following:
 - 1. Selective owner improvements to the EOU steam and condensate site distribution piping.
 - 2. Site trenching and backfill with new distribution piping and vaults.
 - 3. Selective improvements to the basement and tunnel under Quinn Coliseum, including demolition of unused piping and sewage ejector pump replacement.
 - 4. Grading for new construction
 - 5. Project work will include archaeological monitoring (provided by EOU)
- B. Alternates:
 - 1. ADDITIVE ALTERNATE NO. 1: ADD BASIN LINER FOR SEWAGE EJECTOR SE-01
 - a. Provide steel basin liner for existing SE-01 sewage ejector pump receiver basin as shown on drawings and as specified in Section 22 13 29 – Sanitary Sewage and Stormwater Pumps.

1.02 REQUIREMENTS

- A. Owner Occupancy
 - 1. Cooperate with Eastern Oregon University to minimize conflict and to facilitate Eastern Oregon University's operations.
 - 2. Schedule the Work to accommodate Eastern Oregon University use of the site and facilities.
- B. Contractor Use of Site and Premises – Includes building interiors during renovations and remodels:
 - 1. Arrange use of site and premises to allow:
 - a. Work by Others.
 - b. Work by Eastern Oregon University.
 - c. Use of Eastern Oregon University campus pathways and facilities by public.
 - 2. Provide access to and from site as required by law and by Eastern Oregon University:
 - a. Do not obstruct roadways, sidewalks, or other public ways without permit.
 - b. Do not obstruct building corridors or other areas of the project in use by Eastern Oregon University.
 - c. Limit parking and staging areas to areas designated by Eastern Oregon University.
 - 3. Time Restrictions:
 - a. In compliance with the City of La Grande Ordinance #3241, Section 12.A.5 Noise Disturbances: Limit exterior work and equipment startup between the hours of 7:00am and 10:00pm, except by special permit granted by the City of La Grande. For exterior work adjacent to Alikut Hall, Daugherty Hall, North Hall, Quinn Coliseum and Fitness Center, and Zabel Hall, limit work and equipment startup between the hours of 8:00am and 7:00pm.
 - b. Limits to interior work to be determined on a per project basis.
 - 4. Utility Outages and Shutdown:

- a. Limit disruption of utility services to hours the site is unoccupied or as approved by Eastern Oregon University.
 - b. Do not disrupt or shut down life safety systems and utilities, which may impact the campus or other facilities, including but not limited to electrical service, plumbing service, network service, fire sprinklers and fire alarm system, without 7 days notice to Eastern Oregon University and authorities having jurisdiction.
 5. Prevent accidental disruption of utility services to other facilities.
- C. Overtime Work
 1. To permit arrangements for inspections, the Contractor shall notify the Owner's Representative at least 72 hours in advance of any overtime work, including nights, weekends, and holidays. Do no overtime work without notifying Owner's Representative.
 2. The Contractor shall reimburse the Owner for any expenses incurred by them because of Contractor's overtime work.
- D. Work in Public Right of Way
 1. The Contractor shall obtain any required Right-of-Way Work Permits, pay Permit Fees, and comply with governing Regulatory Agency requirements, including providing any additional Insurance required by Public Authority.
- E. Protecting Existing Utilities
 1. Drawings indicate approximate location of any known, concealed Utility Lines. Before starting work, Contractor shall determine exact location of any of these Lines that could be damaged by Contract Work.
 2. Contractor shall assume that other unknown Utility Lines do exist, and Contractor shall proceed with caution when working in areas that could conceal unknown Utilities. If such Utility Lines are encountered, immediately request disposition instructions from Architect and Owner's Representative.
 3. If Utility Lines are damaged, remove, repair, or replace Lines as directed. Additional compensation and/or extensions of time, if any, caused by removing, repairing, or replacing Lines will be determined in accordance with General Conditions.
- F. Correction Period for Non-Complying Work
 1. Contractor's response to notice of Work to be Corrected shall be accomplished during the following time periods:
 - a. Emergency Work:
 - 1) Failures or deficiencies constituting immediate danger or health hazard to People or likely damage to Property.
 - 2) Response Time: 24 hours per day 7 days per week.
 - b. Urgent Work:
 - 1) Failures or deficiencies which do not immediately endanger Persons or Property, but would soon do so if not corrected.
 - 2) Response Time: Between 7AM and 4PM on Mondays through Fridays and within 3 calendar days following receipt of Notice.
 - c. Routine Work:
 - 1) Failures or deficiencies of less importance that do not meet criteria of Emergency or Urgent work.
 - 2) Response Time: Between 7AM and 4PM on Mondays through Fridays and within 5 calendar days following receipt of Notice.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Contract modification procedures.
- C. Additional architectural service for extraordinary contract administration.
- D. Procedures for preparation and submittal of application for final payment.

1.02 DEFINITIONS

- A. Architect's Supplemental Instruction (ASI): Minor change in Work directed by Architect.
- B. Proposal Request (PR): A formal request from Owner to Contractor for change in Contract Sum and Time required to perform the proposed change in Work. Proposal Request is not a directive to perform the proposed change.
- C. "Construction Change Directive" and "Change Order" have meanings defined in AIA Document A201.
- D. Extraordinary Contract Administration: Architectural service to enforce Contract Documents resulting from Contractor's failure to comply with requirements for Contractor's request for accelerated procedures.

1.03 SCHEDULE OF VALUE

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect and Owner for approval.
- B. Forms filled out by hand will not be accepted.
- C. Submit a printed schedule on AIA Form G703 – Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- D. Submit Schedule of Value in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization including mobilization and associated fees for subcontractors.
- F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- G. Revise schedule to list approved Change Orders, with each Application for Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit monthly unless another interval beyond monthly is approved in the Agreement. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect and Owner for approval.
- B. Forms filled out by hand will not be accepted.
- C. Present required information in typewritten form.
- D. Form: AIA G702 Application and Certificate for Payment and AIA G703 – Continuation Sheet including continuation sheets when required.

- E. Execute certification by signature of authorized officer.
- F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- H. Include the following with the application:
 - 1. Construction progress schedule, revised and current as specified in Section 01 3000.
 - 2. Project Record Documents as specified in Section 01 7800, for review by Owner which will be returned to the Contractor.
 - a. Alternative: Review Record Documents with Architect and Owner prior to submitting Application.
 - 3. Preliminary Closeout Documents when specified in Section 01 7800
- I. When Architect or Owner requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.
- J. Submit three copies of each Application for Payment to Owner at times stipulated below.
- K. When Owner finds Application properly completed and correct, he will transmit Payment to Contractor.

1.05 APPLICATION SCHEDULE

- A. Submit Application for Payment on the last working day of the month for which payment is due.

Upon execution of Certificate of Substantial Completion, balance due under Contract will be paid, excluding Retainage.

1.06 PAYMENT FOR PRODUCTS STORED OFF THE PROJECT SITE

- A. When delay or added cost to Owner can be avoided by storing Products off Site, Owner will make payment to Contractor for said Products provided that Contractor shall:
 - 1. Make Storage Facilities available for Owner's Representative's visual inspection.
 - 2. Provide, Invoices, Packing Slips, and or photographs of stored materials if requested by Owner.
 - 3. Segregate and label Stored Products for specified Project.
 - 4. Assume all risk for loss.
 - 5. Assume responsibility for exceeding Product "shelf-life".
 - 6. Protect Stored Products and provide applicable Insurance against their damage, discoloration, and theft, naming the Owner and any Mortgagee as Additional Insureds.
 - 7. Submit itemized Inventory and Schedule of Values for Stored Products together with Certificate of Insurance.
 - 8. Submit payment requests to Owner as part of Contractor's regular Progress Payment Request.
 - 9. Reimburse Owner for damages sustained if Stored Products are not delivered to Jobsite when needed.

10. Submit to Owner, with copy to Architect, a written Waiver of Lien insuring Owner against claims for unpaid Storage Costs.
11. Upon receipt of payment from Owner prepare and issue to Owner, with a copy for Architect and any Mortgagee, a Bill of Sale for Stored Products. (See required Bill of Sale Form bound hereinafter.)

1.07 MODIFICATION PROCEDURES

- A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect and/or Owner will issue instructions directly to Contractor.
- B. Architect will advise on minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instruction on Item of Change Form.
- C. Construction Change Directive: Architect may issue an ASI, signed by Owner, instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 2. Promptly execute the change.
- D. Proposal Request: Architect may issue an ASI which includes a detailed description of a proposed change with supplementary or revised Drawings and specification, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 10 working days.
- E. Contractor may propose a change by submitting a request for information to Architect and/or Owner) describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
 1. For pre-determined unit prices and quantities, the amount shall be based on the fixed unit prices.
- G. Substantiation and Computation of Costs: Provide full information required for evaluation as follows:
 1. Quantities of products, labor, and equipment.
 2. Taxes, insurance, and bonds.
 3. Overhead and profit on products and labor only. Overhead and profit is limited as follows:
 - a. Entity performing work: 10% Materials, 15% Labor
 - b. General Contractor: % per contract with Owner
 4. Justification for any change in Contract Time.
 5. Credit for deletions from Contract, similarly documented
 6. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- H. Execution of Change Orders: Owner will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly enter changes in Project Record Documents.

1.08 APPLICATION FOR FINAL PAYMENT

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

B. Applications for Final Payment will not be considered until the following have been accomplished:

1. All closeout procedures specified in Section 01 7000.
2. Affidavit that payrolls and bills have been satisfied.
3. Consent of Surety to make Final Payment.
4. Certificate evidencing that insurance required after Final Payment will remain in force, and a written statement that Contractor knows of no reason that insurance will not be renewed for the required period.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Stages of the Work, Work covered by each contract, and occupancy.
- B. Section 01 32 00 - Construction Progress Schedule: Form, content, and administration of schedules.
- C. Section 01 70 00 – Contract Closeout Requirements: Additional coordination requirements.
- D. Section 01 78 00 - Closeout Submittals: Project record documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. The owner will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda: Agenda's will be created on a project to project basis and may include the following:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Coordination procedures and separate contracts.
 - 3. Submission of executed bonds and insurance certificates.
 - 4. Distribution and review of Contract Documents.
 - 5. Designation of personnel representing the parties to Contract, Owner and Architect.
 - 6. Safety and emergency procedures, hazardous materials review, and security procedures.

7. Early procurement, and/or lead times for materials and equipment, pre-purchased equipment, review of site area to be occupied by construction, parking, smoking policy, maintenance of access and safety, owner access during construction, job inspections,
 8. Scheduling, critical work sequencing, job inspections,
 9. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 10. Submission of list of Subcontractors, list of Products, schedule of values, monthly payment date, and progress schedule.
 11. Review of Tree and Plant Protection provisions as described in Section 01 5320 as required.
 12. Scheduling of progress meetings.
 13. Review of Contractor Use of Site and Premises provisions as described in Section 01 1000.
- D. The owner/architect to record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. The Contractor will schedule and administer meetings throughout progress of the Work on a weekly basis at minimum, unless determined otherwise.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Project Manager, Job superintendent, major Subcontractors and suppliers as needed, Owner, Architect, as appropriate to agenda topics for each meeting.
- D. Agenda topics may include:
 1. Review minutes of previous meetings.
 2. Safety
 3. Review of Work progress.
 4. Maintenance of progress schedule.
 5. Field observations, problems, and decisions.
 6. Identification of problems that impede, or will impede, planned progress.
 7. Review of submittals schedule and status of submittals.
 8. Review of RFIs schedule and status of RFIs.
 9. Review of PCOs and status of PCOs as needed.
 10. Corrective measures to regain projected schedules.
 11. Planned progress during succeeding work period and specific required progress photos related to the work.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to Work.
- E. The Contractor, will record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS PHOTOGRAPHS

- A. Submit photographs to architect and owner during project as requested. Upon completion of the project, all photographs will be submitted to the Owner and Architect with Closeout Documents.
- B. Provide photographs of site and construction prior to the start of Work and throughout progress of Work produced by an experienced photographer, acceptable to Architect.
- C. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Completion of site clearing.
 - 2. Excavations in progress.
 - 3. Foundations in progress and upon completion.
 - 4. Structural framing in progress and upon completion.
 - 5. Enclosure of building, upon completion.
 - 6. Final completion.

END OF SECTION

SECTION 01 31 13

PROJECT COORDINATION

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 01 10 00 – Summary of Work: Stages of the Work, Work covered by each contract, and occupancy.
- B. Section 01 31 13 Project Coordination
- C. Section 01 32 00 - Construction Progress Schedule: Form, content, and administration of schedules.
- D. Section 01 33 00 – Submittal Procedures: Shop Drawings, Product Data, & Samples
- E. Section 01 50 00 – Temporary Facilities and Controls
- F. Section 01 78 00 - Closeout Submittals: Project record documents.

1.02 CONSTRUCTION ORGANIZATION & START-UP

- A. Establish on-site Lines of Authority and Communications including the following:
 - 1. Schedule and conduct Pre-construction Meeting and Progress Meetings as specified in Section 01 30 00 Administrative Requirements.
 - 2. Establish procedures for project communications including:
 - a. Submittals
 - b. Reports & Records
 - c. Recommendations
 - d. Coordination Drawings
 - e. Schedules
 - f. Resolution of Conflicts
 - 3. Contract Documents Interpretation:
 - a. Consult with Architect to obtain interpretation.
 - b. Assist in resolution of questions or conflicts which may arise.
 - c. Transmit written interpretations to Subcontractors and to other concerned parties.
 - 4. Permits & Approvals:
 - a. Verify that Subcontractors have obtained required Permits and Inspections for Work and for Temporary Facilities.
 - 5. Control use of Site:
 - a. General Contractor to Supervise Field Engineering and Project Layout.
 - b. Allocate Field Office Space and Work and Storage Areas for use of each Subcontractor.

1.03 COORDINATING SUBCONTRACTORS' WORK

- A. Coordinate the Work of all Subcontractors and make certain that, where the Work of one Trade is dependent upon the Work of another Trade, the Work first installed is properly placed, installed, aligned, and finished as specified or required to properly receive subsequent Materials applied or attached thereto.
- B. Direct Subcontractors to correct defects in Substrates they install when Subcontractors of subsequent Materials have a reasonable and justifiable objection to such surfaces.
- C. Do not force Subcontractors to apply or install Product to improperly placed or improperly finished Substrate that would result in an unsatisfactory or unacceptable finished Product.
- D. A representative of the General Contractor will be present at jobsite at all times work is being performed.

1.04 COORDINATING WORK WITH OWNER'S WORK

- A. Coordinate, and make certain that, where Work of either party is dependent upon the other party, the Work first performed is properly placed, installed, aligned, and finished as required to permit the proper installation of the following Work.
- B. If the Other Work in any way interferes with the Contractor's Work, so notify the Owner sufficiently in advance so that the Owner has reasonable time to make necessary adjustments.
- C. If the Contractor's Work in any way interferes with the Other Work, so notify the Owner as soon as possible. If the Contractor's Work must be modified to accommodate the Owner's Work, the Contract Sum and/or the Contract Time will, when necessary, be adjusted by a Change Order.

1.05 CLOSE-OUT DUTIES

- A. Mechanical & Electrical Equipment start-up:
 - 1. Comply with requirements specified in Section 01 70 00 Contract Closeout Requirements.
- B. At completion of Work of each Subcontract, conduct inspection to assure that:
 - 1. Work is acceptable.
 - 2. Specified cleaning has been accomplished.
 - 3. Temporary Facilities and Debris have been removed from Site.

Substantial Completion:

- 4. Conduct inspection and prepare list of Work to be completed or corrected.
 - 5. Assist Architect and Owner in inspection.
 - 6. Supervise correction and completion of Work as established in Architect's Inspection Reports.
- C. Final Completion:
 - 1. Assist Architect and Owner in inspection.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.01 GENERAL

- A. Within 10 Working Days after Contract award, prepare and submit to Architect and Owner estimated Progress Schedules for the Work, with Sub-schedules of Related Activities which are essential to its progress.
- B. Revise Schedules when appropriate.
- C. If Contractor fails to deliver Schedule on time or properly update Schedule, Owner may withhold Progress Payment approval until such time as Contractor complies with these requirements.
- D. If, in Architect's or Owner's opinion, Work progress falls behind approved Schedule, Contractor will be notified and take necessary action to regain lost time.
- E. Contractor shall increase Work amount, or number of shifts, or establish overtime operations, or all three, and submit for review Schedule revisions in which progress rate will be regained, all without additional cost to the Owner.
- F. Contractor's failure to comply with these requirements shall be grounds for determination that Contractor is not prosecuting Work with such diligence as will insure Project completion within specified time.
- G. Upon determination that the Contractor is not prosecuting Work diligently, Owner may terminate Contractor's right to proceed with Work, or any separable part thereof, in accordance with General Conditions.
- H. The Contractor and all Subcontractors, Suppliers, and Manufacturers shall schedule material deliveries and installations to conform with the Schedule, and provisions to this effect shall be included in all Subcontracts.

1.02 RELATED REQUIREMENTS SPECIFIED IN OTHER SECTIONS

- A. Section 01 10 00 – Summary of Work: Stages of the Work, Work covered by each contract, and occupancy.
- B. Section 01 30 00 – Administrative Requirements

1.03 SCHEDULES

- A. Form: Gantt Chart
- B. Horizontal Time Scale: Identify first Work Day of each Week.
- C. Scale and Spacing: Allow space for notations and future revisions.
- D. Headings: Include separate heading for each Specification Section Title and Section Number listed in Project Manual Table of Contents.
- E. Clearly identify Critical Path of Schedule
- F. Provide a live schedule file to owner as requested

1.04 SCHEDULE CONTENTS

- A. Construction Progress Schedule:
 - 1. Show complete sequence of construction by activity.

2. Show dates for beginning, and completion, of each major element of Work.
3. Show percent complete for each task
- B. Submittal Schedule for Shop Drawings, Product Data, and Samples:
 1. Show dates for Contractor's submittals.
 2. Show dates Submittals will be required for Owner-furnished Products, if any.
 3. Show dates Approved Submittals will be required from the Architect.
- C. Products Delivery Schedule:
 1. Show delivery dates for Products furnished by Owner, if any-

1.05 SCHEDULE REVISIONS

- A. Indicate progress of each Activity up to date of each Schedule submission.
- B. Show changes occurring since previous Schedule submission.
 1. Major changes in scope
 2. Activities modified since previous submission
 3. Revised projections of progress and completion
 4. Other identifiable changes
- C. Provide a Narrative Report to define:
 1. Problem areas, anticipated delays, and related impact on Schedule.
 2. Corrective action recommended, and expected effect.
 3. The effect of changes on schedules of other Prime Contractors, if any.

1.06 SUBMISSIONS

- A. Submit initial Schedules within 10 Working days after Contract award.
 1. Architect and Owner will review Schedules and return Review Copy within 10 days after receipt.
 2. If required, resubmit within 7 days after return of Review Copy.
- B. Submit revised Progress Schedules with each Application for Payment.

1.07 DISTRIBUTION

- A. Distribute copies of reviewed Schedules to:
 1. Jobsite file
 2. Subcontractors
 3. Architect
 4. Owner's Representative
- B. Instruct recipients to report promptly to Contractor, in writing, any problems anticipated by projections shown in Schedules.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submit to the owner shop drawings, samples, and product data. When required by the individual specification sections.
- B. Related work specified elsewhere
 - a. Instructions to bidders.
 - b. Eastern Oregon University General Conditions.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 – Summary of Work: Stages of the Work, Work covered by each contract, and occupancy.
- B. Section 01 32 00 - Construction Progress Schedule: Form, content, and administration of schedules.
- C. Section 01 70 00 – Contract Closeout Requirements: Additional coordination requirements.
- D. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 SUBMITTAL SCHEDULING

- A. Submittal scheduling that require review by the Owner only, submittal shall be sent at least 14 calendar days before the date each is required for fabrication and installation.
- B. Submittals to be reviewed by the Owner's consultants shall be sent to the owner at least 20 calendar days before the date each is required for fabrication or installation.
- C. Submittals that include substitution requests or other modifications requiring review by the owner and/or the Owner's consultants shall be sent to the owner at least 20 calendar days before the date required for fabrication and installation.

1.04 Submittal Content and Formatting

- A. General Requirements:
 - 1. Shop Drawings: Submit in electronic format and if requested by the Owner, submit one reproducible copy, and one hard copy of each drawing.
 - 2. Product Data: Submit in electronic format and if requested by the owner submit 4 hard copies.
 - 3. Samples: Submit the number and type based on each specification section. Where color selections are required submit a minimum of 3 sample sets.
 - 4. Submittals to include the following:
 - a. Date, return date requested and revision dates.
 - b. Project title and project number.
 - c. Name of the contractor, subcontractor, and manufacture.
 - d. Identification of product or material, with the applicable specification number.
 - e. Relation to adjacent critical features of work or other materials.
 - f. Verification of field dimensions.
 - g. Any applicable standards ie: ASTM numbers or Federal Standards.

- h. Identify any deviations from the Contract Documents and include Substitution request as required by 01 63 00 Product Substitutions.
 - i. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
 - 5. Re-submission Requirements:
 - a. Revise initial drawings as required and resubmit as specified for initial submittal.
 - b. If applicable, indicate on submittal any changed which have been made other than those requested by the Owner.
 - 6. The Owner reserves the right to return without review any submittal not meeting the requirements listed above.
- B. Shop Drawings
 - 1. Submit data in a clear manner.
 - 2. Details shall be identified by reference sheet and detail or by room numbers shown on the contract drawings.
 - 3. Structural items shall be identified by location in the completed structure.
- C. Product Data:
 - 1. Manufacturer's cut sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
 - a. Clearly mark each copy to identify product or models.
 - b. Show dimensions, weights, and clearances required.
 - c. Show performance data consisting of capabilities, ROM. KW, pressure drops, design characteristics, and consumption; conforming as closely as possible to the test methods referenced in the Plans and Specifications.
 - d. Show wiring or piping diagrams and controls.
 - 2. Manufacturer's standard schematic drawings and diagrams:
 - a. Modify to remove information that is not applicable to the Contract Documents.
 - b. Supplement standard information to provide information specifically applicable to the Work.
- D. Samples
 - 1. Insure samples are of sufficient size to indicate the general visual effect or color.
 - 2. Where samples must show a range of color, texture, finish, graining, or other property, submit sets of pairs illustrating the full scope of this range.
 - 3. One (1) sample or one (1) set of approved samples will be retained by the Owner; final work will be measured against approved samples

1.05 QUALITY ASSURANCE

- A. Process submittals in ample time for review, as applicable, so as to not delay the Work. All submittals shall be received by the Owner within ten (10) days after pre-construction.

1.06 DEFINITIONS

- A. The Owner will mark reviewed materials as follows:
 - 1. "No Exception Taken," which means fabrication, manufacture and/or installation may proceed.
 - 2. "Make Revisions Noted," which means fabrication, manufacture and/or installation may proceed with revisions as noted.
 - 3. "Revise and Resubmit," which means that fabrication, manufacture and/or installation may not proceed.
 - 4. "Rejected," which means do not proceed; make arrangements for the review of the proposed Work with the Owner as soon as possible.

1.07 PROCESSING

- A. Review submittals, make necessary corrections, and become familiar with the content of the submittals.
- B. Mark each item with Contractor's stamp.
- C. Accompany submittals with a transmittal letter bearing the project name, Contractor's name, number of items, and other pertinent data.
- D. Keep one copy of each reviewed submittal on the job site at all times.
- E. Be responsible for obtaining and distributing prints of shop drawings to the various suppliers, and the Owner once review process has been completed. Make prints of reviewed shop drawings only from transparencies which carry the appropriate stamp and endorsement.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 45 00

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 01 45 30 – Testing Laboratory Services
- B. Section 01 70 00 – Contract Closeout Requirements: Additional coordination requirements.

1.02 EXTENT OF WORK

- A. Contractor shall implement and maintain aggressive Quality Control Program conforming to the following requirements:
 - 1. Monitor quality of all Work, including that of Subcontractors and Service Providers, to ensure that Work complies with Contract Documents.
 - 2. Include compliance with currently approved Progress Schedule.
 - 3. Include continuing inspections of Work.
- B. Responsibilities include, but are not limited to the following:
 - 1. Prior to submission to Architect, review and approve Shop Drawings, Product Data, and Samples for compliance with Contract Documents.
 - 2. Prior to starting Work, review appropriate Contract Drawings & Specifications, Shop Drawings, Product Data, Samples, and Contract Modifications, as well as affected Existing Conditions. Notify Architect and Owner of any discrepancies or omissions in Contract Documents. Any issues with existing conditions or site will be brought to the attention of the Owner and Architect.
 - 3. Work closely and cooperate with Owner and Architect, attend required Meetings, and execute decisions reached by Owner.
 - 4. Assign and maintain at Jobsite, Supervisory Personnel acceptable to Owner, who have authority to act in Contractor's behalf at all times Work is being performed, including any Overtime Periods.
 - 5. Schedule and coordinate inspections and tests with Regulatory Agency Inspectors and with Testing Agency Personnel. Inform Owner of scheduled inspections. Inspections will be planned in advance and scheduled. Provide 72-hour notice to Inspection and Regulatory Agencies.
 - 6. Submit to Owner and Architect signed Reports of Inspections and Tests made by Building Officials, Special Inspectors, and any others performing inspections or tests.
 - 7. Schedule and coordinate required Pre-Installation Conferences.
 - 8. Assure that Record Documents, including those prepared by Subcontractors, are accurately maintained and up to date.
 - 9. Schedule and coordinate specified System and Equipment demonstrations and training sessions for Owner's Personnel.
 - 10. Make final inspections with Subcontractors of all Work to determine that Work is in compliance with Contract Documents. Prior to calling for Substantial Completion and Final Inspections, verify that Work deficiencies discovered during Contractor's inspections have been satisfactorily documented and corrected.

11. Accompany Architect/Owner during Architect's/Owner's inspections.
12. Coordinate final closeout procedures, including those of Subcontractors, to assure compliance with procedures specified in Section 01 70 00.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 45 30

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED IN OTHER SECTIONS

- A. Inspections and testing required by laws, ordinances, rules, regulations, and orders of Public Authorities; See General Conditions, AIA Document A 201.
- B. Product Certification; See respective Specification Sections.
- C. Equipment testing, adjusting, and balancing; See respective Specification Sections.

1.02 COSTS

- A. Paid by Owner:
 - 1. For Testing Laboratory services specified in this Section.
 - 2. For Code-required Special Inspections of Masonry, Welding, and Concrete.
- B. Paid by Contractor:
 - 1. For re-inspections and re-testing required because of defective Work or ill-timed notices.

1.03 LABORATORY'S QUALIFICATIONS

- A. Independent Laboratory acceptable to Engineer, Owner, and Building Official.
- B. Meet "Recommended Requirements for Independent Laboratory Qualification," latest edition, published by American Council of Independent Laboratories; 1725 K Street, N.W.; Washington, D.C. 20036.
- C. Meet ASTM E-329 latest edition, "Standards of Recommended Practice for Inspection and Testing agencies for Concrete and Steel as used in Construction".

1.04 LABORATORY'S DUTIES

- A. Provide qualified Personnel for specified inspections, sampling, and testing.
 - B. Ascertain and certify compliance with Contract Documents.
- B. When requested by Engineer, provide interpretation of Test results
- C. Promptly submit written Inspection & Test Reports to:
 - 1. Owner
 - 2. Building Official
 - 3. Contractor
 - 4. Engineer
- D. Additionally, submit copies of the following Reports to:
 - 1. Tested Earthwork: Geotechnical Engineer and Owner.
 - 2. Tested Asphaltic Concrete: Engineer and Owner.
 - 3. Tested Structural Work: Engineer and Owner.
- E. Include the following in Test Reports:
 - 1. Date issued.

2. Project title and location.
 3. Testing Laboratory name and address.
 4. Inspector's name.
 5. Date of inspection or sampling.
 6. Record of temperature and weather.
 7. Date of test.
 8. Identification of Product tested.
 9. Test location in Project.
 10. Type of inspection or test.
 11. Observations regarding compliance with Contract Documents.
- F. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on Contract Documents requirements.
 2. Approve or accept any portion of Work.
 3. Assume any duties of Contractor.
 4. Stop Work.

1.05 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with Laboratory Personnel; provide access to Work and to Manufacturer's operations.
- B. Provide to Laboratory representative access to collect samples of materials to be tested, in required quantities.
- C. Furnish casual labor and facilities:
 1. For access to Work to be tested.
 2. To obtain and handle Test Samples at Site.
 3. To facilitate inspections and tests.
 4. For Laboratory's exclusive use for storage and curing of Test Samples until removed to Laboratory.
- D. Notify Laboratory at least 72 hours in advance of operations to allow for Personnel assignments and Test scheduling.
- E. Repair any Test Holes to match original conditions.
- F. Contractor will be held financially responsible for any cancelled inspections that Owner and Inspector were not made aware of in a reasonable amount of time.
- G. Contractor will be held financially responsible for additional tests required by failure to meet specified design strengths and/or failure to comply with contract documents.

1.06 LIABILITY

- A. Laboratory service does not relieve Contractor's responsibility to comply with Contract Documents.

1.07 SCOPE OF INSPECTIONS

- A. Inspection and Testing will be provided to meet Engineer's requirements as stated in the Contract Documents, City requirements and current code requirements.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and fire protection.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".
- C. Electrical Service: Comply with NEMA, NEC and UL standards and regulations for temporary electric service; install service in compliance with National Electric Code (NFPA 70).
- D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use; obtain required certifications and permits if required.

1.03 PROTECTION

- A. Protect sidewalks, asphalt paving, concrete, trees, shrubs, and lawn areas at all times from damage resulting from construction activities.
- B. Prevent materials from clogging catch basins and yard drains; leave drains clean and in proper working condition.
- C. Protect Existing Irrigation Systems:
 - 1. In the event damage occurs to an underground irrigation system as a direct result of a Contractor's activities, the Contractor shall repair/replace or be assessed a charge at the discretion of the Owner.
 - 2. If repairs are to be made by the Contractor, the repairs will be inspected by the Owner's Authorized Representative prior to backfilling.
 - 3. Any galvanized pipe that requires repair shall be repaired at a threaded coupling, not by use of a compression coupling.
- D. Clean, repair, resurface, or restore existing surfaces to their original, or better, condition, or completely replace such surfaces to match existing, where damaged by construction operations.

1.04 DRAINAGE

- A. Verify that all rain drains in the construction areas are in working order and notify the Owner's Authorized Representative in writing of any rain drains that are plugged, prior to the start of the Work.
- B. Start of Work will be considered as acknowledgment that all drains are clear and in good working order.
- C. All drains shall be left in a clean and proper working condition.

1.05 TEMPORARY UTILITES

A. Temporary Utilities:

1. Prepare a schedule indicating dates for implementation and termination of each temporary utility.
2. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

B. Conditions of Use

1. Keep temporary services and facilities clean and neat in appearance.
2. Operate in a safe and efficient manner.
3. Take necessary fire prevention measures.
4. Do not overload facilities or permit them to interfere with progress.
5. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. :Electrical Service

1. Eastern Oregon University will provide electrical service, consisting of connection to existing facilities. Contractor will be responsible for connections and coordination with EOU.
2. Service limited to 20 amp 120v circuits will be paid for by owner.

D. Water Service

1. Eastern Oregon University will provide water supply, consisting of connection to existing facilities. Contractor will be responsible for connections and coordination with EOU.
2. Service in reasonable quantities for the Project will be paid for by the Owner.
3. Contractor will take all necessary measures to responsibly use and avoid waste of water and energy. Use of city fire hydrants for construction water must be coordinated and approved by the City of La Grande.

E. Telecommunications Service

1. Eastern Oregon University will provide a wireless connection as available to the field office at time of project mobilization.

F. Temporary Sanitary Services

1. In unoccupied renovations or unoccupied zones of a building renovation, use of facility is permitted during construction when fully operational. Otherwise, provide and maintain required facilities and enclosures.
2. Maintain daily in clean and sanitary condition.

1.06 TEMPORARY CONTROLS

A. Barriers

1. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

2. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
3. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

B. Fencing

1. Provide and maintain 6-foot minimum height Commercial grade chain link fencing with wind screen around any portion of the construction site where conditions potentially dangerous to students, staff, or visitors may exist. Equip with vehicular and pedestrian gates with locks. Submit to Owner two keys or combination for each gate lock.
2. Provide access to site to Fire Department by Knox Box, Fire Department Lock, or other means as agreed upon by EOU and Fire Department.

C. Exterior Enclosures

1. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons.

D. Interior Enclosures When Working In An Occupied Building

1. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
2. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces.
3. Provide necessary measures for limiting construction dust and debris to project area. Contractor is responsible for preventing construction dust and debris from entering mechanical systems.

E. Water Control

1. Maintain excavations free of water.
2. Provide, operate, and maintain necessary pumping equipment.

1.07 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Eastern Oregon University's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate operations with Owners Representative.

1.08 TEMPORARY TRAFFIC CONTROL/PEDESTRIAN ACCESSIBILITY

- A. A continuous route for all pedestrians, including persons with disabilities and bicyclists, shall be maintained at all times. When existing pedestrian facilities are disrupted, closed, or relocated in a construction zone, temporary pedestrian facilities shall be provided.
- B. Temporary pedestrian facilities should be safe and accessible. There should be no curbs or abrupt changes in grade that could cause tripping or be a barrier to wheelchair use.
- C. Signage shall be provided directing people to the temporary accessible route. The signage shall include the International Symbol of Accessibility.
- D. Contractors shall not block temporary walkways with vehicles, equipment, construction materials, signs, trash, or other objects that might prohibit pedestrian passage.

- E. Construction equipment and equipment operation must be separated from any open walkways. At construction zones, pedestrian fences or other protective barriers shall be provided to prevent access into the construction zone.

1.09 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Designated existing on-site roads may be used for construction traffic.
- E. Coordinate with EOU and City of La Grande to provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.010 PROGRESS CLEANING & WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
- B. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. On completion of Work, the buildings and grounds shall be left in a condition that is equal to or better than original condition.
- E. In case of failure to do so, the Owner may remove rubbish and charge the cost to the Contractor.
- F. If applicable, open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.011 BULLETIN BOARD

- A. Provide 1 weatherproof 4x4 ft. Bulletin Board where regularly visible to Workers.
- B. Display employee benefits such as Health & Welfare Plan, Pension Plan, etc., if any; Equal Opportunity Employment Requirements; Emergency Telephone Numbers; and other important data.

1.012 PROJECT IDENTIFICATION

- A. Provide project identification sign graphics.
- B. Locate signboard where directed by Owner and ensure the signboard is visible and secure from movement.
- C. No other signs are allowed without Owner permission, except those required by law.

1.013 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Safe-off and remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 53 20

TREE & PLANT PROTECTION

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices (Pruning)."

1.02 QUALITY ASSURANCE

- A. All workers and all supervisory personnel shall, before entering the work site, attend a briefing by the University Arborist on relevant provisions of this section.
- B. Contractor shall comply with the University Arborist's instructions for tree protection and continued tree health when work occurs within the root zones of trees scheduled to remain.
- C. Retain an arborist approved by the University at the Contractor's expense to perform, under the supervision of the Campus arborist, any aerial trimming required in the project. The arborist shall be certified by ISA or licensed in the jurisdiction where the Project is located.

1.03 COORDINATION

- A. Coordinate with other trades affecting or affected by Work of this Section
- B. Provisions of this Section to be reviewed at the pre-construction meeting. Refer to Section 01 30 00.

1.04 PENALTIES

- A. A minimum fine of \$1,000 will be levied against the responsible firm for each violation of the provisions of this specification. In addition, trees between 3-inch and 11-inch in caliper are worth \$500 per caliper inch and 12-inch to 24-inch in caliper are worth \$1,000 per caliper inch, or create tree protection plan with integrated values as part of the bid documents. All caliper measurements to be taken at breast height.

1.05 SUBMITTALS

- A. Qualification Data: Provide proof of arborist license for tree service firm and proposed arborist. Arborist to have a minimum of (5) five years of experience while being licensed.
- B. Tree Pruning Schedule: Written schedule from arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
- C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

PART 2 PRODUCTS

2.01 FENCING

- A. Tree protection fencing shall be one of the following at the Contractor's option:
 - 1. Wirebound woodroll snow fence 4-feet high minimum, with 3/8 inch by 1-1/2 inch wide pickets, spaced approximately 2" apart bound together with at least 13 gauge galvanized steel wire. Posts shall be barbed wire type steel fence posts, same height as fence.
 - 2. Galvanized chain link fencing, minimum 4-feet high. Stakes for fencing shall be galvanized

steel posts, same height as fence, driven a minimum of two feet into the ground or supported by concrete block temporary footings. Posts shall be spaced 10 feet on center maximum.

3. Tensar Safety Grid-GS Orange, BX 20521, or as approved, minimum 4-feet high with barbed wire type steel fence posts, same height as fence.

PART 3 EXECUTION

3.01 PROTECTION

- A. Protection of Soil Structure: Work with topsoil, whether native or imported, or work conducted over areas of topsoil that are intended to support plants shall not be performed under wet weather conditions, excessively dry conditions, or be compacted by excessive equipment or foot traffic.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.
- C. Tree and Plant Protection Areas: Due to the amount and high quality of the existing trees and plants within the work area, all areas within the project limits are to be considered tree and plant protection areas unless otherwise approved by the University arborist. The Contractor shall exercise utmost care to protect existing trees and plants as specified in this Section. The Contractor shall install tree and plant protection fencing if additional protection is required when working within the drip line of existing trees or when significant roots are present in the soil. The location and requirements for fencing shall be determined by the University arborist prior to, and at any time during the course of the work.
 1. Fencing:
 - a. Install temporary fencing around tree protection zones indicated on the Drawings or as directed by the University arborist to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete. Install chain-link fence according to ASTM F 567 and manufacturer's written instructions.
 - b. Fencing shall be installed beyond the drip line of the trees to be protected, unless otherwise approved by the University arborist.
 - c. Tree and plant protection fences shall remain in place until all work is completed and shall not be removed or relocated without the approval of the University arborist.
 - d. Signs shall be mounted on the protection fencing at 30foot intervals warning construction personnel to keep out of protective zones and informing that violations are subject to fine.
 2. Prohibit entry into plant protection areas except under the direct supervision of the University arborist.
 3. Prohibit earth stockpiling, material storage, vehicle or equipment parking and vehicle traffic within the tree and plant protection areas.
- D. Tree and Plant Protection
 1. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
 2. All work within the drip line will be conducted with an air spade to expose tree root system.
 3. Prohibit foot and vehicle traffic which may compact soil over root systems.

4. Prohibit cutting, breaking, and skinning of branches and roots. All pruning of branches and roots is to be approved in advance by the University and is to be performed by the University approved arborist under the supervision of the University Arborist.
5. Prohibit skinning and bruising of bark.
6. Prohibit fires, high-heat, and smoke adjacent to trees and plants.
7. All servicing of construction equipment is to be carried out within the areas designated for equipment servicing on the site plan or as directed by the University.

3.02 WATERING

- A. During the contract period, water pre-existing trees and plant growth located adjacent to construction areas as directed by the University Arborist.

3.03 CLEARING WITHIN PROTECTION AREAS

- A. Selective clearing within tree protection areas, if required, shall be performed only by the Landscape Contractor selected for the landscaping portion of the project at a time scheduled with the University and in a manner directed by the University Arborist.
- B. Do not strip topsoil or grub understory within protection areas. The trees and understory which are to be removed shall be cut instead of pulling or grubbing. Leave the soil undisturbed.

3.04 CLEARING FOR CONSTRUCTION

- A. When trees or brush which are to be removed are next to trees that will remain, they must be cut instead of pulled or grubbed so as to cause the least disturbance to the soil.
- B. All plants that are not marked for saving and that will interfere with construction are to be removed before construction begins.
- C. Any pruning required to provide clearance for construction equipment or construction operations is to be performed by a University-approved arborist under the direction of the University Arborist. Such pruning is to be completed before construction begins.

3.05 EXCAVATION

- A. Locations and limits of excavations shall be established in the field in consultation with the University and the University Arborist.
- B. The Contractor shall paint on the ground the exact locations of excavations. Excavations shall be represented on the ground in outline, except trenches exceeding 20' in length may be shown as a single line representing the center line of the trench. Crossing bars representing the width of the trench shall be placed every 50' along trench routes.
- C. Any changes to locations of excavations, including trench routes, shall be made in consultation with the University and the University Arborist. The changes must be painted on the ground in a color contrasting with previous markings.
- D. The Contractor shall record on the Record Copy of the Architects drawings the dates on which excavation locations are established and revised in the field and the color of paint used to mark the locations and each revision of location.
- E. The Contractor shall maintain the painted lines representing excavations and keep them visible until the excavations are made.

3.06 EXCAVATION AROUND TREES

- A. Any method of digging or cutting which tears roots or disturbs soil beyond the grading limit or excavation limit is unacceptable.

- B. If roots larger than 1" dia. require removal, call the University Arborist to sever them from the tree.
- C. When roots larger than 1" dia. are encountered while trenching, call the University Arborist for directions on how to proceed. Depending on the proximity to trees and the orientation of the trench, boring or hand digging may be required.
- D. Provide temporary support and protect roots against damage until permanently relocated and covered with backfill.
- E. Do not allow exposed roots to dry before permanent backfill is placed.

3.07 CONSTRUCTION PRUNING

- A. Where roots have been cut, engage a University-approved arborist to prune the tree under the direction of the University Arborist to compensate for root loss, if required by the University.

3.08 GRADING AND FILLING AROUND TREES

- A. If it appears that a grade change will be required within the drip line of a tree which is to be preserved, report to the University arborist for evaluation and instruction.

3.09 REPAIR AND REPLACEMENT OF PLANTS, INCLUDING TREES

- A. At the option of the University, repair, and replace or compensate the University for plants damaged by construction operations.
- B. Make repairs promptly after damage occurs to prevent progressive deterioration.
- C. Remove and replace dead and damaged plants that are determined by the University arborist to be incapable of recovery to normal growth pattern.
- D. Unless otherwise approved, provide plants of same size and species as those removed.
- E. Plant and maintain as specified in Landscaping Specifications Section 02900.
- F. Where damaged trees cannot realistically be repaired or replaced, pay the University, as liquidated damage, value of trees as determined by Guide For Tree & Landscape Appraisers and as distributed by International Society of Arboriculture (ISA). (Copies can be obtained from Society at Box 71, Urbana, IL 61801).
- G. Unless immediate replacement is required by the University, visible damage to the branches trunks or roots of established trees not marked for demolition will cause the owner to withhold from the Contractor the amount of \$200 per inch caliper of the tree (measured at four feet above grade) for a period of two years. After that period the impact of the damage will be assessed by the University in accordance with the ISA Guide. If, in the opinion of the University, the tree is in fair to good health, the damage fine will be refunded; if the tree is in poor condition or lost, the fine will not be refunded.

3.10 REPAIR AND REPLACEMENT OF LAWNS

- A. Repair lawn areas damaged by construction operations.
- B. Match or improve upon original lawn condition.
- C. Perform work as described in The Campus Tree Plan.

END OF SECTION

SECTION 01 61 16

VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. VOC restrictions for product categories listed below under "DEFINITIONS".
- B. All products of each category that are installed in the project must comply; Eastern Oregon University does not allow for partial compliance.

1.02 DEFINITIONS

- A. VOC-Restricted Products: All products of each of the following categories when installed or applied on the building.

1.03 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Evidence of Compliance: Submit for each different product in each applicable category.
- C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified in State of California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GREENGUARD Children & Schools certification; www.greenguard.org
 - b. Current SCS Indoor Advantage Gold certification; www.scscertified.com
 - c. Product listing in the CHPS Low-Emitting Materials Product List at www.chps.net/manual/lem_table.htm.
 - d. Current certification by any other agencies acceptable to CHPS.
 - e. Report of laboratory testing performed in accordance with CHPS requirements for getting a product listed in the Low-Emitting Materials Product List; report must include laboratory's statement that the product meets the specified criteria.
 - 2. Product data submittals showing VOC content are NOT acceptable forms of evidence.
- B. Adhesives and Joint Sealants: Provide only products having volatile organic compound (VOC) content not greater than required by South Coast Air Quality Management District Rule No. 1168.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.

**VOLATILE ORGANIC
COMPOUND (VOC) CONTENT RESTRICTIONS**

Page 2 of 2

- C. Aerosol Adhesives: Provide only products having volatile organic compound (VOC) content not greater than required by GreenSeal GS-36.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GreenSeal certification.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Eastern Oregon University reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Eastern Oregon University.
- B. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by the General Contractor.

END OF SECTION

SECTION 01 63 00

PRODUCT SUBSTITUTIONS

PART 1 GENERAL

1.01 GENERAL

- A. Wherever a Material, Article, or piece of Equipment is identified on the Drawings or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, or the like, it is so identified for the purpose of establishing a standard, and any material, article, or piece of equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or piece of equipment so proposed is, in the opinion of the Engineer, of equal substance, appearance, and function. The substituted Product shall not be purchased or installed by the Contractor without the Engineer's written approval.
- B. In collaboration with the Owner, the Engineer will be sole judge of acceptability of any proposed substitution.
- C. Only approved substitutions may be used on Contract Work.
- D. Each request for substitution approval shall include:
 - 1. Identity of Product for which substitution is requested; include Specification page and line number.
 - 2. Identity of substitution; include complete Product description, drawings, photographs, performance and test data, and any other information necessary for evaluation.
 - 3. Quality comparison of proposed substitution with specified product.
 - 4. Changes in other Work required because of substitution.
 - 5. Effect on construction progress schedule.
 - 6. Cost of proposed substitution compared with specified product.
 - 7. Any required license fees or royalties.
 - 8. Availability of maintenance service.
 - 9. Source of replacement materials.

1.02 SUBSTITUTIONS DURING BIDDING PERIOD

- A. No request for substitution approval will be considered unless the request has been submitted on Standard Form bound herein-after, and has been received by Engineer at least 5 Working Days prior to Bid opening.
- B. Requests must be emailed. Facsimile (Fax) submittals will not be considered.
- C. Engineer will issue Addenda prior to Bid opening listing all approved substitutions.

1.03 SUBSTITUTIONS AFTER CONTRACT AWARD

- A. Approval will be granted only when:
 - 1. Specified Product cannot be delivered without Project delay, or
 - 2. Specified Product has been discontinued, or
 - 3. Specified Product has been replaced by superior Product, or

4. Specified Product cannot be guaranteed as specified, or
 5. Specified Product will not perform properly, or
 6. Specified Product will not fit within designated space, or
 7. Specified Product does not comply with governing codes, or
 8. Substitution will be clearly in Owner's interest.
- B. Owner will issue Change Order authorizing approved substitutions and revising Contract Sum where appropriate.

1.04 CONTRACT COMPLIANCE

- A. Substitution approval does not relieve Contractor from responsibility for proper execution of the Work and for compliance with other Contract requirements.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 70 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 CONTRACT CONDITIONS

- A. Comply with Contract Condition requirements and specified Administrative Procedures in closing out Work.

1.02 SUBSTANTIAL COMPLETION INSPECTION

- A. When Contractor considers Work substantially complete, as defined in General Conditions, he shall submit to the Engineer and Owner:
 - 1. Written notice that Work, or designated portion thereof, is substantially complete.
 - 2. List of Items to be completed or corrected.
- B. Engineer will, as soon as possible thereafter, make inspection to determine completion status.
- C. Should Engineer determine that Work is not substantially complete:
 - 1. Engineer will promptly notify Contractor and Owner in writing, giving reasons therefore.
 - 2. Contractor shall remedy Work deficiencies and send second notice of substantial completion to Engineer and Owner.
 - 3. Engineer will re-inspect Work.
- D. When Engineer concurs that Work is substantially complete, he will:
- E. Prepare Certificate of Substantial Completion using AIA Document G704, accompanied with Contractor's list of items to be completed or corrected, as verified and amended by Engineer.
- F. Submit Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

1.03 FINAL INSPECTION

- A. When Contractor considers Work complete, he shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Contractor has inspected Work for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
- B. Equipment and Systems have been tested in presence of Owner's Representative and are operational.
 - 1. Work is complete and ready for final inspection.
 - 2. Engineer will inspect Work to verify completion status as soon as possible after receipt of Contractor's Certification.
 - 3. Should Engineer consider Work incomplete or defective:
- C. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
- D. Contractor shall immediately remedy deficiencies and send second written certification to Engineer that Work is complete.
- E. Engineer will re-inspect Work.

- F. When Engineer finds Work acceptable under Contract Documents, he will request Contractor to make closeout submittals.

1.04 REINSPECTION FEES

- A. Engineer will make one Substantial Completion Inspection to determine any Work Deficiencies and 1 Final Completion Inspection to ascertain that Deficiencies have been satisfactorily corrected.
- B. Should Engineer be required to make more than 2 Inspections due to Contractor's failure to correct specified Deficiencies:
 - 1. Owner will compensate Engineer for such additional services.
 - 2. Owner will deduct Engineer's compensation amount from Contractor's final payment as follows:
 - a. Engineer's time at current Billing Rates.
 - b. Engineer's Employees' time at current Billing Rates.
 - c. Others at 1.10 times direct cost incurred.
 - d. Charges will be made for necessary travel time, inspection time, inspection report writing time, auto expense computed per the EOU Travel Reimbursement Policy, and all other expenses incurred in making inspections.

1.05 EVIDENCE OF PAYMENTS & RELEASE OF LIENS

- A. Contractor shall submit the following:
 - 1. Contractor's Affidavit of Payment of Debts and Claims, AIA Doc. G706.
 - 2. Contractor's Affidavit of Release of Liens, AIA Doc. G706A including the following:
 - a. Consent of Contractor's Surety to Final Payment, AIA Doc. G707.
 - b. Contractor's Release or Waiver of Liens.
 - c. Separate releases or waivers of lien for Subcontractors, Suppliers, and others with lien rights against Owner's Property, together with list of those parties.
- B. Contractor shall duly sign and execute all Submittals, before delivery to Engineer.

1.06 CONTRACTOR'S CLOSEOUT SUBMITTALS TO OWNER

- A. Certificate of Insurance for Products & Completed Operations: AIA Document A 201.
- B. Project Record Documents: See Section 01 78 00
- C. Owner's Operating & Maintenance Manual: See Section 01 78 00

1.07 SPARE PARTS & MAINTENANCE MATERIALS SUBMITTAL TO OWNER

- A. Specific Requirements: See Specification Sections.
- B. Products: Identical to those included in Project Work.
- C. Storage Location: On Project premises where directed by Owner.
- D. Required Submittals:
 - 1. As required by Specifications

1.08 DEMONSTRATIONS

- A. Instruct Owner in operation of all Systems and Equipment in accordance with Section 01 79 00.
Provide video recording of Owner instruction and training when requested.

1.09 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit final statement of accounting to Owner, including the following:
 - 1. Original Contract Sum
 - 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Other adjustments
 - c. Deductions for uncompleted Work
 - d. Deductions for Re-inspection Payments
 - 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.
- B. Owner will prepare and issue final Change Order, reflecting approved adjustments to Contract Sum not previously made by Change Orders.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 74 00

CLEANING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Related requirements specified elsewhere, cleaning for specific products or work: Specification section for that work.
- B. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
- C. At completion of Work remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

1.02 QUALITY ASSURANCE

- A. Standards: Maintain project in accord with applicable safety and insurance standards.
- B. Hazard Control:
 - 1. Store volatile wastes in covered metal containers.
 - 2. Provide adequate ventilation during use of volatile or noxious substances.

1.03 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.04 DURING CONSTRUCTION:

- A. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- B. At reasonable intervals during progress of Work clean site and public properties, and dispose of waste materials, debris and rubbish.
- C. Provide on-site containers for collection of waste materials, debris and rubbish.
- D. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- E. Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until project is ready for Substantial Completion or occupancy.
- F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

1.05 FINAL CLEANING

- A. Employ experienced workers, or professional cleaners, for final cleaning.
- B. In preparation for Substantial Completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, and other foreign materials from exposed interior and exterior finished surfaces.
- D. Remove putty, paint, labels, lubricants, etc., from windows, mirrors, and sash, and then polish, taking care not to scratch glass.

- E. Vacuum carpeting (shampoo where required), removing debris and excess nap.
- F. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- G. Replace air filters where units were operated during construction.
- H. Maintain cleaning until project, or portion thereof, is occupied by Owner.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Eastern Oregon University requires that projects generate the least amount of trash and waste possible.
- B. Contractor shall employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Concrete
 - 2. Aluminum and plastic beverage containers.
 - 3. Corrugated cardboard.
 - 4. Wood pallets.
 - 5. Clean dimensional wood.
 - 6. Metal, including packaging banding, metal studs, sheet metal, structural steel, piping, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 7. Plastic buckets.
 - 8. Plumbing fixtures.
 - 9. Mechanical and electrical equipment.
 - 10. Metal will be disposed of in EOU Facilities' metal bin.
- E. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
 - 5. Incineration, either on- or off-site.
- F. Regulatory Requirements: The General Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state, and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. Provide containers as required.
 - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
 - 4. Schedule regular pick-ups to avoid overfill and undesirable odors.
- B. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- C. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- D. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- E. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and Bonds.

1.02 RELATED REQUIREMENTS

- B. Section 01 33 00 – Submittal Procedures
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Owner with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit one electronic pdf copy of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer and Owner will review draft and return with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit pdf copy of completed documents 15 days prior to final inspection. These copies will be reviewed and returned after final inspection, with Engineer and Owner comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit one hard copy set and one digital set of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.
- G. Record Drawings will be reviewed each month prior to payment if required by Owner.
- H. At completion of project, provide Record Drawings to Design Team for drafting.

3.02 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- D. Provide servicing and lubrication schedule, and list of lubricants required.
- E. Include manufacturer's printed operation and maintenance instructions.
- F. Include sequence of operation by controls manufacturer.
- G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- H. Additional Requirements: As specified in individual product specification sections.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system

description identified, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
 - e. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
 - f. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Unless stated otherwise the warranty period will be for twelve (12) months following the date of Substantial Completion.
- C. Verify that documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Retain warranties and bonds until time specified for submittal.
- F. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

3.07 ELECTRONIC COPIES

- A. Provide all closeout submittals, including Record Drawings, Record Specifications, Operation and Maintenance Manuals, Submittals, Demonstration Videos, and Warranty information, organized on a single Hard Drive or Flash Drive, labeled for this project.

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
 - 5. Landscape irrigation equipment.
 - 6. Snow melt equipment.
 - 7. Fire alarm equipment.
 - 8. Access Control and Security equipment.
 - 8. Audio Visual equipment.
 - 9. Clean Agent Fire Suppression Systems.
 - 10. Specialty Items/Equipment.
 - 11. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
 - 2. Finishes, including flooring, wall finishes, ceiling finishes.
 - 3. Fixtures and fittings.
 - 4. Landscape systems such as plantings and irrigation fixtures and fittings.
 - 5. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.
- C. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit not less than four weeks prior to start of training.
 - 2. Revise and resubmit until acceptable.
 - 3. Provide an overall schedule showing all training sessions to Owner for approval.

4. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 1. Include applicable portion of O&M manuals.
 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
 1. Identification of each training session, date, time, and duration.
 2. Sign-in sheet showing names and job titles of attendees.
 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.

1.04 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the

purposes of this section, unless approved in advance by Owner.

- B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Contractor will prepare the Training Plan.
- B. Conduct training on-site unless otherwise indicated.
- C. Owner will provide conference room or classroom and seating, if needed, at no cost to Contractor.
- D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Owner.
- E. Provide training in minimum two hour segments.
- G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 - 3. Typical uses of the O&M manuals.
- I. Product- and System-Specific Training:
 - 1. Review the applicable O&M manuals.
 - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety

issues and emergency procedures.

6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.
 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by Contractor.
 11. Review spare parts suppliers and sources and procurement procedures.
- J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide a complete written response within three days.

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, all hangers including the top connection and any fastenings to building structural systems, line voltage and low voltage power, signal, or control wiring. Seal all openings after removal of equipment, pipes, ducts, raceway, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity and fire rating 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 removal of hazardous or unsanitary conditions.
 - 2. Removal of unsuitable or extraneous materials not marked for salvage, and debris such as rotted wood, rusted metals, and deteriorated concrete.
 - 3. Removal of 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.
 - 1. All removed material not to be salvaged to the Owner or reused shall become property of the Contractor and shall be promptly removed from site. Do not store or permit debris to accumulate on site.
 - 2. 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 22 05 00

GENERAL PLUMBING PROVISIONS

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

- A. General plumbing provisions apply to all work performed in Division 22.
- 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. 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 and Owner's Authorized Representative prior to fabrication.
- E. Make minor changes in equipment connections and equipment locations as directed or required before rough-in without extra cost.
- F. For products specified by listing one or more manufacturers, followed by "Similar to" and one manufacture's model number, the following requirements apply:
 - 1. Approval of each listed manufacturer is contingent upon that manufacturer having a product which meets the specification, fits in the available space, and is comparable to the listed model.
 - 2. Electrical requirements, duct connections, pipe connections, and space requirements indicated on the Drawings are based on the listed model and may not be suitable for all manufacturers listed. Provide revisions required to accommodate the model actually furnished.
- G. For product specified by listing one or more manufacturers, followed by a model number for each manufacturer, the following requirements apply:
 - 1. Provide one of the listed model numbers or an approved substitution.
 - 2. Electrical requirements, duct connections, pipe connections, and space requirements indicated on the Drawings are based on one of the listed models, and may not be suitable for all models listed. Provide revisions required to accommodate the model actually furnished.

1.02 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): A federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority.
- B. Owner's Authorized Representative (OAR): Owner's representative with authority to act on Owner's behalf.
- C. The words furnish, install, and provide are defined as follows:

1. Furnish: To supply and deliver to the project ready for installation and in operable condition.
2. Install: To place in final position, complete, anchored, connected in operable condition.
3. Provide: To furnish and install complete. Includes the supply of specified services.
4. When neither furnish, install, or provide is stated, provided is implied.

1.03 COORDINATION

- 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/Engineer and secure written approval and agreement on necessary adjustments before start of work.
- B. Coordinate identification systems with other trades. All plumbing and mechanical systems shall use identical piping, valve, and equipment identification and regulatory signage.

1.04 SUBMITTALS AND SHOP DRAWINGS

- A. Conform with requirements in Division 01.
- B. Action Submittal Content
 1. Action submittal information not expressly required by the specifications will not be reviewed.
 2. Action submittal information shall be provided in sufficient detail to establish conformance with specified requirements. Where submitted literature includes multiple models, features, or options, the specific models, features, or options proposed shall be clearly indicated. Where a brief inspection shows that product data is not complete, the submittal will be rejected without review.
 3. Action submittal data shall be clear, concise, legible, and relevant. Where data is not properly organized and contains significant information that is not relevant, the submittal will be rejected without review.
 4. Action submittal requirements will be listed in individual specification sections. The following definitions apply.
 - a. Materials List: Provide tabular list of materials including specification reference, specification product name, manufacturer, model/part number, and size and/or quantity where appropriate. Do not include supplemental data, except where specifically requested.
 - b. Catalog data: Manufacturer's standard product cut sheet.
 - c. Product Data: Detailed data including dimensions, weight, materials of construction, connections, and all other information needed to confirm that the product conforms to all requirements listed in the individual specification section.
 - d. Performance Data: Capacity, input, output, flow, etc. as required to confirm that the product meets the performance requirements scheduled in the Specifications or on the Drawings.
 - e. Wiring Diagrams: Power and control wiring diagrams.
 - f. Shop Drawings: Construction drawings of items manufactured specifically for this project including dimensions, construction details, weights, and additional information to identify the physical features of the system or piece of equipment.
 - g. Installation Instructions
 - h. Special Requirements Listed: Additional requirements indicated in individual specification sections.
- C. Delegated Design
 1. Delegated work will include but is not limited to the following.

- a. Section 22 13 29 – Sanitary Sewage and Stormwater Pumps.
2. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - a. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
3. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.05 QUALITY ASSURANCE

- A. All materials and equipment provided hereunder shall be installed and started in complete conformance with the manufacturer's recommendations.
- B. Asbestos products or equipment or materials containing asbestos shall not be used.

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.
- B. Materials and equipment provided hereunder shall be rated for the service conditions of the system to which they are connected including but not limited to temperature, pressure, and humidity.

1.07 CODES AND 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 Division 01 as required for completion of work.
- B. Maintain existing systems operational. Owner will be responsible to operate and maintain existing equipment during the course of the project. However, any damage to existing equipment resulting directly from work under this Contract shall be repaired by the Contractor at no expense to Owner.

1.09 FIELD CONDITIONS

- A. Interruption of Existing Service: Do not interrupt water, sanitary waste, storm drain, or natural gas services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services according to requirements indicated:

1. Notify Owner's Authorized Representative no fewer than five business days in advance of proposed interruption of services.
- B. Do not proceed with interruption of services without written permission of Owner's Authorized Representative.

1.10 OPERATIONS AND MAINTENANCE MANUALS

- A. Provide manuals as noted in Division 01, clearly indexed and bookmarked 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. Manual Content: Manuals shall contain complete information for each item of plumbing electrical or other operating equipment. Include as applicable:
 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

1.11 RECORD DRAWINGS

- A. Provide record "as-built" drawings in accordance with Division 1 requirements. Show all deviations from contract drawings and location of underground lines by accurate dimensions from building lines. Show depth of all stub outs and underground lines. Dimension all concealed piping from column grids or building lines. Transfer all information to one hard copy of drawings at completion of project. Alternately, provide electronically using .pdf markup of contract drawings.

1.12 DEMONSTRATION

- A. General: After installation is complete, demonstrate to Engineer and Owner's Authorized Representative satisfaction as being complete and operational and entirely in conformance with Contract Documents.

- B. Preparation: Prior to demonstration, submit check-off list indicating completeness of submittals and certificates of compliance for review to Owner's Authorized Representative. Operate completed system for one week. Verify that control verification is complete and verification report has been approved by Architect/Engineer.
- C. Arrange for demonstration with Owner, Engineer, required factory technicians, and installer at least one week in advance of demonstration.

1.13 TRAINING

- A. Instruct Owner in proper operation and maintenance of equipment and systems. Instruction shall generally include topics listed in manufacturer's operations and maintenance manual. Operator instructions shall cover all aspects of manual, automatic, and safety controls. Contractor shall also instruct the Owner in the general configuration of systems and location of equipment and components.
- B. Furnish competent qualified technicians knowledgeable in the plumbing systems and equipment provided for this project for a minimum of 1-hour on-site to instruct Owner in operation and maintenance of systems and equipment. This figure does not include additional training noted under individual specification sections. Contractor shall keep a log of this instruction including date, times, subjects, and those present and shall present such log when requested by Engineer. Contractor shall coordinate training with Owner's Project Manager and provide a schedule for training minimum two-weeks prior to Substantial Completion. All training shall be complete 30-days after Substantial Completion.
- C. Contractor shall furnish training by equipment manufacturers in addition to training described in this section where specifically listed in other sections. Contractor shall schedule training with Owner's Project Manager minimum 48-hours prior to training session. Equipment shall be fully operational prior to scheduling training session. Manufacturer's field start-up, adjustment, and service will not fulfill manufacturer's training requirement.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MATERIALS

- A. All materials employed in permanent construction shall be new, full weight, in first class condition, and suitable for space provided. All similar equipment and materials shall be of one manufacturer.
- B. Equipment used as the basis of design is scheduled on drawings or designated in product specifications. If Contractor chooses to use equipment that is not the basis of design, Contractor is responsible for all re-design and construction costs associated with variations in arrangement, dimension, or capacity. Such work may include, but is not limited to, changes to facility structure or dimensions and revisions to associated plumbing and electrical systems needed to provide equal system performance and maintainability.

2.02 ELECTRICAL EQUIPMENT

- A. Electrical Disconnect Switch: Electrical disconnect switches specified for plumbing equipment shall conform to OSHA Lock-out/Tag-out requirements.
- B. All electrical equipment shall be listed as approved for its application by the Underwriters Laboratory or other testing agency approved by the State of Oregon Electrical and Elevator

Board. Approval indicates agency meets testing standard requirements for electrical safety required by Oregon Revised Statutes 479.510 through 479.855 and Oregon Administrative Rules.

- C. Enclosure: Provide the following electrical equipment enclosure types unless otherwise noted.
 - 1. NEMA 1: Dry, enclosed locations where the ambient temperature will not be outside of the VFD temperature ratings.
 - 2. NEMA 12: Enclosed mechanical spaces equipped with floor drains where dripping or splashing may occur and where the ambient temperature will not be outside of the VFD temperature ratings.
 - 3. NEMA 3R: Swimming pool mechanical rooms and other mechanical spaces where more sustained water spray is possible
 - 4. NEMA 3R with Temperature Control: Outdoors or in unconditioned spaces where ambient temperatures will be outside of the VFD temperature ratings.
 - 5. Enclosure will be provided with a ventilation fan and heater capable of maintaining enclosure temperature within the manufacturer's recommended range. Drive and enclosure shall be a single, UL-listed assembly with single point electrical connections.

2.03 FIRESTOPPING

- A. Acceptable Manufacturers: 3M, Hilti, Tremco, Nelson Firestop Products.
- B. Provide firestopping for the following:
 - 1. All penetrations through fire resistance rated floors, walls and partitions including openings containing pipes, ducts and other penetrating items.
 - 2. All penetrations through non-fire resistance rated floors where the vertical service riser penetrates three or more floors.
- C. Firestop system shall be UL Classified for the application and correspond to those indicated by reference to designation listed by UL Fire Resistance Directory.
- D. Material shall be tested in accordance with UL-1479, ASTM E-814 for the specific fire-rated construction conditions confirming to construction assembly type, penetration item type, annular space requirements, and fire-rating involved.

2.04 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Acceptable Manufacturers: J.L. Industries, Karp Associates, Inc., Meadowcraft, Inc., Mifab, Milcor Div.; Inryco, Inc., or Nystrom, Inc.
- B. Application: Match access door to wall or roof assembly fire rating.
- C. Access Door Assembly: Continuous welded steel construction unless otherwise indicated. Grind exposed welds smooth and flush with adjacent surfaces. Provide anchors and attachments necessary for installation indicated.
 - 1. Frames: 16 gage steel; provide flange type necessary for the installation required.
 - 2. Stainless Steel Frames and Flush Panel Doors: 14 gage stainless steel, No. 4. satin finish; concealed spring hinges or concealed piano hinge set to open 175 degrees.
 - 3. Flush Doors: 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees
 - 4. Lock: Screwdriver-operated cam locks, number required to hold door flush when closed.

- 5. Ceiling Doors: Recessed door panel depth necessary to finish ceiling insert and install flush to adjacent finish ceiling. Reinforced 18 gage sheet steel face. Provide access sleeves for locking devices. Size: As necessary for efficient access, but not less than 24 by 24 inches. Obtain Architect's acceptance of manufacturer's standard size units which vary from sizes indicated.
- D. Fire Rated Units: Comply with NFPA 80, provide UL listed and labeled units having performance level required with insulated flush panel door, continuous piano hinge and self-closing mechanism for rated assemblies in sizes and configuration required.
 - 1. Vertical Doors: NFPA 252 or UL 10B.
 - 2. Horizontal Doors: ASTM E 119 or UL 263.
- E. Shop Applied Coating: Corrosion resistant prime paint compatible with field applied finish specified in Division 09.
- F. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 tested according to the following test method:
 - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.05 SPECIAL TOOLS AND LUBRICANTS

- A. Furnish and turn over to Owner, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.

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, motors, belts, and all other plumbing equipment requiring access for removal or maintenance. Type, size and exact location of access doors shall be coordinated with Architect prior to work.
- B. Provide clearances for maintenance access as indicated on Drawings or as recommended by manufacturer. If access requirements shown on Drawings conflict with manufacturer's recommendations, provide larger clearance of the two.
- C. If equipment location shown on Drawings does not allow required access, notify Architect/Engineer prior to start of work.
- D. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to Architect/Engineer for resolution prior to starting work.
- E. Provide access doors as required for access to plumbing equipment. Doors required for access are not necessarily shown on Drawings. Consult with Architect for direction on placement of required doors not shown on Drawings.
 - 1. Comply with manufacturer's instructions for installation of access doors. Provide all necessary support and supplemental framing for assembly where the access doors are required. Set accurately in position, plumb, level, and flush to adjacent finish surfaces; and secure to support.

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. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.
- C. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
- D. 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.
- E. 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.
- F. Work in Existing Building: Cut required openings through existing masonry and reinforced concrete using diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the Owner's Authorized Representative. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the Architect/Engineer for determination of proper design for openings through structural sections and obtain layout approval prior to cutting or drilling into structure. After Architect/Engineer's approval, carefully cut opening through construction no larger than absolutely necessary for the required installation.
- G. Switchgear Drip Protection: Do not install piping above electrical switchgear.
- H. Inaccessible Equipment
 1. Where the Owner's Authorized Representative determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.
 2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3.03 EXISTING EQUIPMENT REUSED OR RELOCATED

- A. All equipment designated as existing or furnished by Owner shall be cleaned and repaired before reinstallation. Any items requiring repair shall be brought to the attention of the Construction Manager before the item is reinstalled. Damage not brought to the attention of the Construction Manager shall be deemed the result of reinstallation of the item and shall be repaired without expense to the Owner.

3.04 PLUMBING SYSTEMS FIRESTOPPING

- A. Do not cover firestop installations until the examined by the Authority Having Jurisdiction, if required.
- B. Install firestopping in accordance with manufacturer's recommendations and conditions of product UL listing.

3.05 CLEANING SYSTEMS

- A. General: After all equipment and pipes 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.

3.06 START UP

- A. The Plumbing 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.

END OF SECTION

SECTION 22 05 13

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, squirrel-cage induction and electrically commutated motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.02 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 PRODUCTS

2.01 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.
- B. Comply with IEEE 841 for severe-duty motors.

2.02 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40°C and at altitude of 3,300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 POLYPHASE INDUCTION MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Premium efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15 unless listed otherwise under section where motor is provided.
- D. Rotor: Random-wound, squirrel cage.
- E. Bearings: Re-greaseable, shielded, antifriction ball bearings suitable for radial and thrust loading.

- F. Temperature Rise: Match insulation rating.
- G. Insulation: Class F.
- H. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- I. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.
- J. Enclosure Type: 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 smoke exhaust fans, fire pumps and similar equipment.
 - 4. Motors 10 HP and larger.
- K. Additional Requirements for Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Inverter Duty as defined in NEMA MG 1 with Class F temperature rise; Class H insulation.
 - 2. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 3. Maximum RPM: 3600 rpm minimum, or 150% of as design motor speed, whichever is greater.
 - 4. Speed Ratio:
 - a. Constant load applications: 4:1, except 1000:1 where high turndown motor is required.
 - b. Variable torque applications: 20:1, except 1000:1 where high turndown motor is required.
 - 5. Bearing Protection Ring: For motors controlled by variable frequency drives, provide maintenance free, conductive microfiber, shaft grounding ring with a minimum of two rows of circumferential microfibers to discharge electrical shaft currents within the motor and/or its bearings. AEGIS SGR or approved equal.
- L. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.04 SINGLE-PHASE ELECTRICALLY COMMUTATED MOTORS

- A. General: Electrically commutated, variable-speed, DC, brushless, direct drive type. Motor rotor shall be permanent magnet type with near zero rotor losses.
- B. Bearings: Heavy duty, pre-lubricated, antifriction ball bearings.
- C. Motor Controller: Single-phase integrated controller/inverter that operates the wound stator and senses rotor position to electronically commutate the stator. Motors designed for synchronous rotation and to overcome reverse rotation.
 - 1. Operating Speed: Controllable from 100% to 20% of full speed.
 - 2. Motor Control: Remote digital input.
 - 3. Speed Control: Provide either manual or remote speed control input as specified and as required to perform intended function:

- a. Manual: Potentiometer dial mounted on the motor.
 - b. Remote modulating analog input: 4-20mA or 0-10 VDC.
- 4. Soft-start function to reduce inrush current at start-up.
- 5. Overcurrent Protection.
- 6. Thermal Overload Protection.

- D. Electrical Input: Single phase, 60 hertz. Voltage as required or as scheduled on drawings.

- E. Efficiency: Motor shall be minimum of 70% efficient over entire operating range.

2.05 SINGLE-PHASE INDUCTION MOTORS

- A. Motors larger than 1/20 HP shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.

- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

- C. Bearings: Pre-lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

- D. Motors 1/20 HP and Smaller: Shaded-pole type.

- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify motor mounts are compatible with motor frame.

3.02 INSTALLATION

- A. Motors Used with Variable Frequency Controllers: Arrange location of motor, variable frequency controller and electrical wiring to ensure the distance from motor to inverter does not exceed manufacturer recommended maximum length.

3.03 APPLICATION

- A. Electronically Commutated Motor Speed Control.
 - 1. Remote speed control where required for variable volume applications to perform specified control sequences.
 - 2. Manual speed control for constant volume applications.

- B. Induction Motors.
 - 1. Motors Less Than 1/2 HP: Single-Phase.
 - 2. Motors 1/2 HP and larger: Polyphase.

END OF SECTION

SECTION 220514

COMMON MOTOR CONTROL REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Motor controller use on ac power systems up to 600 V installed at equipment manufacturer's factory or furnished separately for field installation.
- B. Section Includes:
 - 1. Full-voltage magnetic motor controllers.
 - 2. Combination full-voltage magnetic motor controllers.
 - 3. Enclosures.
 - 4. Accessories.

1.02 DEFINITIONS

- A. CPT: Control power transformer.
- B. MCCB: Molded-case circuit breaker.
- C. MCP: Motor circuit protector.
- D. DDC: Direct digital control.
- E. EMI: Electromagnetic interference.
- F. OCPD: Overcurrent protective device.
- G. SCCR: Short-circuit current rating.
- H. SCPD: Short-circuit protective device.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of magnetic motor controller.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each type of magnetic controller.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Indicate dimensions, weights, required clearances, and location and size of each field connection.
 - 3. Wire Termination Diagrams and Schedules: Include diagrams for power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.
 - 4. Include features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

- C. Product Schedule: List the following for each controller:
 - 1. NRTL listing.
 - 2. Factory-installed accessories.
 - 3. SCCR of integrated unit.

1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For magnetic controllers to include in operation and maintenance manuals.
 - 1. In addition to items specified in Division 01, include the following:
 - a. Routine maintenance requirements for magnetic controllers and installed components.
 - b. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 - c. Manufacturer's written instructions for setting field-adjustable overload relays.
 - d. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subject to weather, cover controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers.

1.07 FIELD CONDITIONS

- A. Ambient Environment Ratings: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than 23 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet for electromagnetic and manual devices.
 - 3. The effect of solar radiation is not significant.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Magnetic motor controllers to comply with UL 508 and UL 60947-4-1.
- C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.

- D. Overload Relay Trip Characteristics: Provide Class 20 except as follows:
 - 1. Motor controller that are integral with equipment assembly and installed at the manufacturer's factory shall have trip characteristics as recommended by the equipment manufacturer.
- E. Factory Assembled Equipment:
 - 1. Each motor controller shall be provided with a factory installed isolation switch.

2.02 MAGNETIC MOTOR CONTROLLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton.
 - 2. General Electric Company.
 - 3. Rockwell Automation, Inc.
 - 4. Siemens Industry, Inc.
 - 5. Schneider Electric, Square D.
- B. Description: Across-the-line start, electrically held, for nominal system voltage of 600-V ac and less.
- C. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- D. Configuration: Non-reversing.
- E. Contactor Coils: Pressure-encapsulated type.
 - 1. Operating Voltage: Manufacturer's standard, unless indicated.
- F. Control Power:
 - 1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
- G. Overload Relays:
 - 1. Solid-State Overload Relay:
 - a. Switch or dial selectable for motor-running overload protection.
 - b. Sensors in each phase.
 - c. Tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - d. Class II ground-fault protection shall comply with UL 1053 to interrupt low-level ground faults. The ground-fault detection system shall include circuitry that will prevent the motor controller from tripping when the fault current exceeds the interrupting capacity of the controller. Equip with start and run delays to prevent nuisance trip on starting, and a trip indicator.

2.03 COMBINATION FULL-VOLTAGE MAGNETIC MOTOR CONTROLLER

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton.
 - 2. General Electric Company.
 - 3. Rockwell Automation, Inc.
 - 4. Siemens Industry, Inc.
 - 5. Schneider Electric, Square D.

- B. Description: Factory-assembled, combination full-voltage magnetic motor controller consisting of the controller described in this article, indicated disconnecting means, SCPD and OCPD, in a single enclosure.
- C. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- D. Configuration: Non-reversing.
- E. Contactor Coils: Pressure-encapsulated type.
 - 1. Operating Voltage: Manufacturer's standard, unless indicated.
- F. Control Power:
 - 1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
- G. Overload Relays:
 - 1. Solid-State Overload Relay:
 - a. Switch or dial selectable for motor-running overload protection.
 - b. Sensors in each phase.
 - c. Tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
- H. Class II ground-fault protection shall comply with UL 1053 to interrupt low-level ground faults. The ground-fault detection system shall include circuitry that will prevent the motor controller from tripping when the fault current exceeds the interrupting capacity of the controller. Equip with start and run delays to prevent nuisance trip on starting, and a trip indicator.
- I. Fusible Disconnecting Means:
 - 1. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate indicated fuses.
 - 2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
- J. Non-fusible Disconnecting Means:
 - 1. NEMA KS 1, heavy-duty, horsepower-rated, non-fusible switch.
 - 2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
- K. MCP Disconnecting Means:
 - 1. UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - 2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
- L. MCCB Disconnecting Means:
 - 1. UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse-time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - 2. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 3. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

2.04 ENCLOSURES

- A. Enclosures for field mounted and factory package equipment assemblies.
 - 1. Factory Packaged Equipment Assemblies: Conform with Section 22 05 00 - General Plumbing Provisions, Electrical Equipment and requirements of package equipment specifications sections.
 - 2. Field Mounted: Comply with NEMA 250, type designations, complying with environmental conditions at installed location.
 - 3. Conform with Section 22 05 00 - General Plumbing Provisions, Electrical Equipment.
- B. The construction of the enclosures shall comply with NEMA ICS 6.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and space conditions for compliance with requirements for motor controllers, their relationship with the motors, and other conditions affecting performance of the Work.

3.02 INSTALLATION

- A. Comply with NECA 1.
- B. Wall-Mounted Controllers: Install magnetic controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks.
- C. Floor-Mounted Controllers: Install controllers on cast-in-place concrete equipment base(s).
- D. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- F. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.
- G. Hand-Off-Auto Switch: Safety interlocks for life-safety or emergency shutdown to protect equipment or systems shall be wired so that safety interlocks are active in both Hand and Auto position.

3.03 APPLICATION

- A. Provide motor controllers as scheduled on drawings and as otherwise specified.
- B. Magnetic Motor Controllers:
 - 1. Field Installed: Combination Magnetic Motor Controllers.
 - 2. Factory Packaged Assemblies: Magnetic Motor Controllers or Combination Magnetic Motor Controllers. Comply with requirements of equipment specification sections.

3.04 FIELD QUALITY CONTROL

- A. Start-up and Testing of Motor Controllers:
 - 1. Contractor to test and inspect components, assemblies, and equipment installations, including connections.
 - 2. Tests and Inspections:
 - a. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
 - b. Visual and Mechanical Inspection:
 - 1) Compare equipment nameplate data with drawings and specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify the unit is clean.
 - 5) Inspect contactors:
 - a) Verify mechanical operation.
 - b) Verify contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
 - 6) Verify overload element rating is correct for its application.
 - 7) Inspect bolted electrical connections for high resistance.
 - 8) Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
 - c. Electrical Tests:
 - 1) Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Insulation-resistance values shall be according to manufacturer's published data or NETA ATS Table 100.1.
 - 2) Test motor protection devices according to manufacturer's published data.
 - 3) Test circuit breakers as follows:
 - a) Operate the circuit breaker to ensure smooth operation.
 - b) For adjustable circuit breakers, adjust protective device settings according to the coordination study. Comply with coordination study recommendations.
 - 4) Perform operational tests by initiating control devices.
- B. Motor controller will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.05 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain motor controllers.

END OF SECTION

SECTION 22 05 17

SLEEVES, SLEEVE SEALS, AND ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes sleeves, sleeve seals, escutcheons, and related materials.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.01 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.02 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. GPT, an EnPro Industries company.
 - 2. Metraflex Company (The).
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Carbon steel.
 - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.03 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Non-shrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.04 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated or rough-brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. Split-Casting Brass Type: With polished, chrome-plated or rough-brass finish and with concealed hinge and setscrew.

2.05 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.01 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide annular clear space between piping and concrete slabs and walls recommended by manufacturer.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. See Section 22 05 00 – General Plumbing Provisions.
- F. Install sleeve-seal systems in sleeves or core-drilled holes in exterior concrete walls and slabs-on-grade at service piping entries into building.
- G. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in

penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.02 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Galvanized-steel wall sleeves and sleeve-seal system.
 - 2. Exterior Concrete Walls below Grade:
 - a. Cast-iron wall sleeves with sleeve-seal system.
 - 3. Concrete Slabs Below Grade
 - a. Cast-iron wall sleeves with sleeve-seal system
 - 4. Concrete Slabs above Grade and Interior Partitions:
 - a. Galvanized-steel-pipe sleeves.

3.03 ESCUTCHEONS

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
- C. Use one-piece, deep-pattern escutcheons for new piping where fittings would protrude from the wall and be exposed if standard escutcheons were used
- D. Escutcheons for New Piping:
 - 1. Finished Areas: One-piece, cast-brass type with polished, chrome-plated finish.
 - 2. Unfinished Areas: One-piece, cast-brass type, rough brass finish.
- E. Escutcheons for Existing Piping:
 - 1. Finished Areas: Split-casting brass type with polished, chrome-plated finish.
 - 2. Unfinished Areas: Split-casting brass type with rough brass finish.
- F. Install floor plates for piping penetrations of equipment-room floors.
- G. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.

END OF SECTION

SECTION 22 05 23

VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes valves for plumbing service.

1.02 DEFINITIONS CWP: Cold working pressure.

- A. EPDM: Ethylene propylene copolymer rubber.
- B. NRS: Non-rising stem.
- C. RS: Rising stem.

1.03 ACTION SUBMITTALS

- A. Provide catalog data for each type of valve.
- B. Provide certification that products comply with NSF 61.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set butterfly valves closed or slightly open.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.1 for flanges on iron valves.
 - 2. ASME B16.5 for flanges on steel valves.
 - 3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 4. ASME B31.9 for building service piping valves.
- C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- E. NSF Compliance: NSF 372 for valve materials for potable-water service.
- F. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- G. Valve Sizes: Same as upstream piping unless otherwise indicated.

2.02 GATE VALVES

- A. Iron Gate Valves, RS, Class 150:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves/Conbraco Industries, Inc.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Jenkins Valves; Crane Energy Flow Solutions.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Stockham; Crane Energy Flow Solutions.
 - 2. Class 150, RS, Iron Gate Valves:
 - a. Standard: MSS SP-70, Type I.
 - b. CWP Rating: 300 psig.
 - c. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - d. Ends: Flanged.
 - e. Trim: Bronze.
 - f. Disc: Solid wedge.
 - g. Packing and Gasket: Asbestos free.

2.03 CHECK VALVES

- A. Iron, Swing Check Valves with Lever and Weight-Closure Control, Class 125:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves/Conbraco Industries, Inc.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - 2. Description:
 - a. Standard: MSS SP-71, Type I.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Clear or full waterway.
 - d. Body Material: ASTM A126, gray iron with bolted bonnet.
 - e. Ends: Flange or threaded. See valve schedule articles.
 - f. Trim: Bronze.
 - g. Gasket: Asbestos free.
 - h. Closure Control: Factory-installed exterior lever and weight.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine mating flange faces for damage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- D. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

- A. Install valves with unions or flanges to isolate each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement, with handle swing in direction of flow.
- E. Install check valves a minimum of five pipe diameters away from changes of direction, pumps, or equipment that can generate turbulent flow in piping.

3.03 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL VALVE APPLICATIONS.

- A. Provide valves for isolation of services as shown on Drawings and at the following locations:
 - 1. Where piping enters the building.
 - 2. At branch connections from piping risers at each floor.
 - 3. Major branches and branches to remote equipment or fixtures for all supply and return systems.
 - 4. As required to individually isolate all equipment and maintainable devices including automatic air vents and hydronic control valves.
 - 5. To individually isolate building systems by section.
 - 6. Where piping penetrates mechanical room walls. Locate valve inside mechanical room.
 - 7. Branch connections for utility systems including piping in utility tunnels.
 - 8. Point of entry into individual suites, classroom, or laboratories for all plumbing piping systems, gas, compressed air, Nitrogen, vacuum, water, etc.

3.05 SEWAGE AND SUMP PUMP VALVE SCHEDULE

- A. Shutoff Service: Iron Gate Valves, RS, Class 150.
- B. Check Valve: Iron, Swing Check Valves with Lever and Weight-Closure Control, Class 125.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes hangers and supports for plumbing piping and equipment.

1.02 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
1. Supports for multiple pipes, including pipe stands, shall be capable of supporting combined weight of supported systems, system contents, and test water.
 2. Equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.04 ACTION SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 22 05 00 – General Plumbing Provisions. Submittal requirements indicated by column number designation as follows:
1. Materials List
 2. Catalog Data
 3. Detailed Data
 4. Performance Data
 5. Wiring Diagrams
 6. Shop Drawings
 7. Installation Instructions
 8. Special Requirement listed herein.

PRODUCT TABLE	1	2	3	4	5	6	7	8
Pipe Hangers and Supports		X						
Thermal Hanger Shield Inserts		X						

1.05 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.01 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.02 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.03 METAL FRAMING SYSTEMS

- A. MFMA Manufacturer Metal Framing Systems:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. B-line, an Eaton business.
 - b. Thomas & Betts Corporation; A Member of the ABB Group.
 - c. Unistrut; Part of Atkore International.
 - 2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
 - 3. Standard: MFMA-4.
 - 4. Channels: Continuous slotted steel channel with intumed lips.
 - 5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - 6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
 - 7. Metallic Coating: Electroplated zinc or hot-dipped galvanized.

2.04 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.05 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.06 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Non-staining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
 - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- E. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.02 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.03 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.04 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.05 HANGER SPACING

A.

PLUMBING PIPING SPACING TABLE	Maximum Horizontal Span	Maximum Vertical Spacing
Carbon Steel and Stainless-Steel		
1-1/4 inch and smaller	7 feet	15
1-1/2 inch to 2-1/2 inch	10 feet	15
3 inch and larger	12 feet	15
Copper Tubing		
3/4 inch and smaller	5 feet	10
1 inch to 2 inch	7 feet	10
2-1/2 inch and larger	10 feet	10
PVC less than 100°F and CPVC less than 130°F		
All Sizes	4 feet	10
PEX		
All sizes	32 inches	10
Cast Iron		
All sizes	5 feet except where 10 foot lengths are installed.	

3.06 ROD SIZES

- A. Select rod diameter to not exceed the maximum safe load listed in Table 2 of MSS SP-58-2009.

3.07 HANGER AND SUPPORT SCHEDULE

- A. Single Pipe, Hung and Uninsulated
 - 1. NPS ½ to NPS 3: Adjustable Steel Band Hanger, MSS Type 7.
 - 2. NPS 4 and Larger: Steel Clevis, MSS Type 1.
- B. Single Pipe, Hung and Insulated
 - 1. Operating Temperature Less Than Ambient: Steel Clevis, MSS Type 1
 - 2. Operating Temperature Greater Than Ambient.
 - a. NPS ½ to NPS2: Steel Clevis, MSS Type 1.
 - b. NPS 3 and Larger: Adjustable Roller Hanger: Type 43.
- C. Multiple Pipe Trapeze or Pipe Rack: Trapeze Hanger, MSS Type 59.
 - 1. Uninsulated Piping: Steel Strap.
 - 2. Insulated Piping: Adjustable Roller, MSS Type 43.
- D. Single Pipe Floor Support: Adjustable Pipe Support Saddle: MSS Type 38.
- E. Vertical Piping: For riser support and restraint see Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- F. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- G. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- H. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers, and metal framing systems and attachments for general service applications.
- I. Use stainless-steel pipe hangers and stainless-steel attachments for **<insert use>** applications.
- J. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- K. Use padded hangers for piping that is subject to scratching.
- L. To eliminate the need for seismic restraint, for piping installation where the distance from the top of the pipe to the structure is 12 inches or less for the entire run, select hanger-rod and building attachments to allow pipe movement without stress on hangers and attachments.
- M. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450°F piping installations.
 - 3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - 4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450°F piping installations.

- N. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- O. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450°F piping installations.
 3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450°F piping installations.
- P. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- Q. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- R. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- S. Vertical-Piping Supports: Unless otherwise required, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- T. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications.
- U. Comply with MFMA-103 for metal framing system selections and applications.
- V. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
- W. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Valve tags.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.03 COORDINATION

- A. Coordinate with Division 23. Match manufacturer, type, and style of identification used.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Marking Services, Inc.
 - c. Seton Identification Products
 - 2. Material and Thickness: Aluminum, 0.032-inch minimum thickness and having predrilled or stamped holes for attachment hardware.
 - 3. Letter Color: Black.
 - 4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4-inch.
 - 5. Minimum Letter Size: 1/4-inch for name of units if viewing distance is less than 24 inches, 1/2-inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
 - 6. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

- B. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch thick and having predrilled holes for attachment hardware.
 - 2. 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.
 - 3. Maximum Temperature: Able to withstand temperatures up to 160°F.
 - 4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4-inch.
 - 5. Minimum Letter Size: 1/2-inch height.
 - 6. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number,
- D. Equipment Label Schedule: For each item of equipment to be labeled, prepare an equipment label schedule on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.03 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass or aluminum, 0.025-inch minimum thickness and having predrilled or stamped holes for attachment hardware.
 - 2. Minimum Tag Size: 1-1/2 inches, round.
 - 3. Fasteners: Brass wire-link chain or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors. Label inside of access doors with equipment name or general purpose of equipment behind access door with stenciled sign or markers.

3.03 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of plumbing equipment. Labels are required for plumbing equipment scheduled on drawings:
- B. Locate equipment labels where accessible and visible.

3.04 PIPE LABEL INSTALLATION

- A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each flange.
 - 3. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 4. Within 3 feet of penetrations through walls, floors, ceilings, inaccessible enclosures, valves, equipment connections, and branch connections.
 - 5. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 6. Near major equipment items and other points of origination and termination.
 - 7. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
- B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- C. Pipe Label Color Schedule: Letter and background color in accordance with ANSI A13.1.

3.05 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Information. Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch valve tag numbers.

END OF SECTION

SECTION 22 13 16

SANITARY WASTE, VENT, AND STORM DRAIN PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes pipe, fittings, and joining methods for sanitary waste, vent and storm drain piping.

1.02 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
 - 2. Waste, Force-Main Piping: 100 psig.

1.03 ACTION SUBMITTALS

- A. Provide materials list for pipe and fittings.
- B. Provide catalog data for dielectric fittings.

1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.05 FIELD CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Refer to requirements in Section 22 05 00 – General Plumbing Provisions.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

2.02 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:
 - 1. Standards: ASTM C 1277 and CISPI 310.
 - 2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.03 GALVANIZED-STEEL PIPE AND FITTINGS

- A. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Standard Weight class. Include square-cut-grooved or threaded ends matching joining method.

- B. Galvanized-Cast-Iron Drainage Fittings: ASME B16. 12, threaded.
- C. Steel Pipe Pressure Fittings:
 - 1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Schedule 40, seamless steel pipe. Include ends matching joining method.
 - 2. Malleable-Iron Unions: ASME B16. 39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
 - 3. Galvanized-Gray-Iron, Threaded Fittings: ASME B16. 4, Class 125, standard pattern.
- D. Cast-Iron Flanges: ASME B16. 1, Class 125.
 - 1. Flange Gasket Materials: ASME B16. 21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - 2. Flange Bolts and Nuts: ASME B18. 2. 1, carbon steel unless otherwise indicated.

2.04 PVC PIPE AND FITTINGS

- A. Solid-Wall Schedule 80 PVC Pipe:
 - 1. Solid-Wall PVC Pipe: ASTM D 1785, drain, waste, and vent for pressure applications.
 - 2. PVC Socket Fittings: ASTM D 2467, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 80 pipe.
 - 3. Adhesive Primer: ASTM F 656.
 - 4. Solvent Cement: ASTM D 2564.

2.05 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
 - 1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
 - 2. Unshielded, Non-pressure Transition Couplings:
 - a. Standard: ASTM C 1173.
 - b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - c. End Connections: Same size as and compatible with pipes to be joined.
 - d. Sleeve Materials:
 - 1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
 - 3. Pressure Transition Couplings:
 - a. Standard: AWWA C219.
 - b. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
 - c. Center-Sleeve Material: Carbon steel, stainless steel, or ductile iron.
 - d. Gasket Material: Natural or synthetic rubber.
 - e. Metal Component Finish: Corrosion-resistant coating or material.

PART 3 - EXECUTION

3.01 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Division 31.

3.02 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved by Engineer.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
 - 1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
 - 2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
 - a. Straight tees, elbows, and crosses may be used on vent lines.
 - 3. Do not change direction of flow more than 90 degrees.
 - 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Do not reduce size of waste piping in direction of flow.
- J. Lay buried building waste piping beginning at low point of each system.
 - 1. Install true to grades and alignment indicated, with unbroken continuity of invert.
 - 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
 - 3. Maintain swab in piping and pull past each joint as completed.
- K. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller.
 - 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- L. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- M. Install steel piping according to applicable plumbing code.
- N. Install aboveground PVC piping according to ASTM D 2665.
- O. Plumbing Specialties:

1. Install cleanouts at grade where shown on drawings. Provide a cleanout to exterior grade wherever sanitary or storm drain piping leaves the building.
 2. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
- P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- Q. Install sleeves for piping penetrations of walls, ceilings, and floors.

3.03 JOINT CONSTRUCTION

- A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- B. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1. 20. 1.
1. Cut threads full and clean using sharp dies.
 2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
 - c. Do not use pipe sections that have cracked or open welds.
- C. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- D. Plastic, Non-pressure Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 appendixes.

3.04 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
1. Install transition couplings at joints of piping with small differences in ODs.
 2. In Waste Drainage Piping: Non-pressure transition couplings. Unshielded above grade.
 3. In Aboveground Force Main Piping: Fitting-type transition couplings.

3.05 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger and support devices and installation specified in Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment.
- B. Support vertical piping and tubing at base and at each floor.

3.06 CONNECTIONS

- A. Connect waste piping in sizes indicated, but not smaller than required by plumbing code.

- B. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- C. Make connections according to the following unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.07 FIELD QUALITY CONTROL

- A. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- B. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
 - a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
 - a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
 - b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
 - c. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.
 - a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
 - b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
 - c. Air pressure must remain constant without introducing additional air throughout period of inspection.
 - d. Inspect plumbing fixture connections for gas and water leaks.
 - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 6. Prepare reports for tests and required corrective action.
- C. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
 - 2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials.
 - a. Isolate test source and allow to stand for four hours.
 - b. Leaks and loss in test pressure constitute defects that must be repaired.
 - 3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 4. Prepare reports for tests and required corrective action.

3.08 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping during construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.09 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. All sanitary waste shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 2. Dissimilar Pipe-Material Couplings: Non-pressure transition couplings.
- C. Aboveground, vent piping shall be any of the following:
 - 1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 2. Galvanized-steel pipe, drainage fittings, and threaded joints.
 - 3. Dissimilar Pipe-Material Couplings: Unshielded, Non-pressure transition couplings.
- D. Aboveground sanitary-sewage force mains shall be any of the following:
 - 1. Galvanized-steel pipe, pressure fittings, and threaded joints.
 - 2. Solid-wall Schedule 80 PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 3. Fitting-type transition coupling for piping smaller than NPS 1-1/2 and pressure transition coupling for NPS 1-1/2 and larger if dissimilar pipe materials.

END OF SECTION

SECTION 22 13 29

SANITARY SEWAGE AND STORMWATER PUMPS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Submersible sump pumps.
 2. Wet-pit-volute sewage pumps.
 3. Sewage pump shutoff and check valves.
 4. Design and installation of sewage pump basins and basin covers provided in Division 22 as scheduled or described herein.

1.02 ACTION SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 22 05 00 – General Plumbing Provisions. Submittal indicated by column number designation as follows
1. Materials List
 2. Catalog Data
 3. Product Data
 4. Performance Data
 5. Wiring Diagrams
 6. Shop Drawings
 7. Installation Instructions
 8. Special Requirement listed herein

PRODUCT TABLE	1	2	3	4	5	6	7	8
Submersible Sump Pumps			X	X				
Wet-Pit-Volute Sewage Pumps			X	X				
Sewage and Sump-Pump Basins and Basin Covers								X

- B. Special Requirements for Sewage and Sump-Pump Basins and Basin Covers.
1. Product Data: For each type of product, illustrate and indicate style, material, strength, fastening provisions, and finish for each type and size of basin and cover required.
 2. Shop Drawings: Detail fabrication and assembly of basins and covers. Detail fabrication including anchorages and attachments to structure to resist uplift due to buoyancy, assuming the basins are subject to complete immersion in water.
 3. Installation Guidelines: Detail installation requirements of new basin and cover inside existing basin to remain in place, including grout fill requirements for interstitial space, attachment quantities, radial spacing, minimum distance from floor edge, and embedment.
 4. Calculations: Provide design calculations to verify that seismic restraint will comply with the current Oregon Structural Specialty Code for the site.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Retain shipping flange protective covers and protective coatings during storage.
- B. Protect bearings and couplings against damage.

- C. Comply with manufacturer's written instructions for handling.

1.04 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- B. Coordinate location and installation requirements of permanently installed lifting points for sewage ejectors with other trades.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. UL Compliance: Comply with UL 778 for motor-operated water pumps.
- C. Provide design of basins and basin covers in accordance with current Oregon State Structural Specialty Code.

2.02 SUBMERSIBLE SUMP PUMPS

- A. Submersible, Fixed-Position, Single-Seal Sump Pumps (SP-1):
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - a. Bell & Gossett; a Xylem brand.
 - b. Goulds Water Technology; a Xylem brand.
 - c. Grundfos Pumps Corp.
 - d. Liberty Pumps.
 - e. ProFlo.
 - f. Weil.
 - g. Zoeller Company.
 - 2. Basis of Design: ProFlo PF92342.
 - 3. Description: Factory-assembled and -tested sump-pump unit.
 - 4. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal effluent pump as defined in Hydraulics Institute (HI) 1.1-1.2 and HI 1.3.
 - 5. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
 - 6. Impeller: Statically and dynamically balanced, closed or semi-open design for clear wastewater, and keyed and secured to shaft.
 - 7. Pump and Motor Shaft: Stainless-steel, with factory-sealed bearings.
 - 8. Seal: Mechanical.
 - 9. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 10. Controls:
 - a. Switch Type: Mechanical-float type.

2.04 WET-PIT-VOLUTE SEWAGE PUMPS

A. Wet-Pit Volute Sewage Pump (SE-01)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong Fluid Technology.
 - b. Chicago Pump Company; Grundfos Pumps Corporation.
 - c. PACO Pumps; Grundfos Pumps Corporation, USA.
 - d. Peerless Pump Company.
 - e. Swaby Manufacturing Company.
 - f. Tramco Pump Company.
 - g. Vertiflo Pump Company.
 - h. Weil Pump; a Wilo Company.
2. Description: Factory-assembled and -tested sewage-pump unit.
3. Pump Type: Wet-pit-volute, single-stage, separately coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
4. Pump Casing: Cast iron, with open inlet, and threaded or flanged connection for discharge piping.
5. Pump Shaft: Stainless-steel.
6. Impeller: Statically and dynamically balanced, ASTM A48/A48M, Class No. 25 A cast iron, ASTM A532/A532M, abrasion-resistant cast iron, or ASTM B584, cast bronze, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
7. Sleeve Bearings: Bronze. Include oil-lubricated, intermediate sleeve bearings at 48-inch-maximum intervals if basin depth is more than 48 inches, and grease-lubricated, ball-type thrust bearings.
8. Pump and Motor Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
9. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A53/A53M, Schedule 40, steel pipe with ASME B16.1, Class 125, cast-iron flanges and flanged fittings or ASME B16.4, Class 125, gray-iron threaded fittings.
10. Support Plate: Cast iron or coated steel; strong enough to support pumps, motors, and controls. See "Sewage-Pump Basins and Basin Covers" Article for requirements.
11. Shaft Seal: Stuffing box, with graphite-impregnated braided-yarn rings and bronze packing gland.
12. Motor: Single speed; grease-lubricated ball bearings and mounted on vertical, cast-iron pedestal.
13. Controls:
 - a. Enclosure: NEMA 250, Type 12; wall mounted duplex alternating pump control panel, similar to Weil 8151.
 - b. Switch Type: Tethered mechanical-float type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables, similar to Weil 8230. Floats shall include:
 - 1) Off/stop.
 - 2) Lead/start.
 - 3) Lag/standby.
 - 4) High water alarm.
 - c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - d. Indication, Annunciation, and Test Features:
 - 1) Test and silence switches.
 - 2) Power status light.
 - 3) Enclosure-mounted high-water alarm visual and audible annunciation.
 - 4) Motor power and control power indicator lights.
14. Control-Interface Features:
 - a. Remote Alarm Contacts: For remote alarm interface.

- b. Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - 1) Pump loss-of-power alarm.
 - a) Provide via normally closed relay on the line side of control panel power.
 - 2) High water alarm.

2.05 SEWAGE AND SUMP-PUMP SHUTOFF AND CHECK VALVES

- A. Description: Line-size check and isolation valves specified in Section 22 05 23 – Valves for Plumbing Piping, provided Hereunder.
- B. Components: Include the following corrosion-resistant-metal components:
 - 1. Simplex Pumps:
 - a. Valves: One shutoff valve and one check valve.
 - b. Pipe and Fittings: Size and configuration required to connect to sump pumps and piping.
 - 2. Duplex Pumps:
 - a. Valves: Two shutoff valves and two check valves.
 - b. Pipe and Fittings: Size and configuration required to connect to sewage pumps and piping

2.06 SEWAGE AND SUMP-PUMP BASINS AND BASIN COVERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Highland Tank.
 - 2. US Pipe Fabrication.
 - 3. Weil Pump; a Wilo Company.
- B. Basins: Factory-fabricated, watertight, cylindrical, basin sump with top flange and sidewall openings for pipe connections.
 - 1. Material: Fabricated steel with bituminous-type coating inside and out, similar to Farbertite TDS water-based coal tar coating.
 - 2. Reinforcement: Mounting plates for pumps, fittings and accessories.
 - 3. Anchor Flange: Same material as or compatible with basin sump, attached to sump, in location and of size required to anchor basin to existing concrete slab.
- C. Basin Covers: Fabricated metal cover with openings having gaskets, seals, and bushings; for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables.
 - 1. Finish: Slip-resistant surface texture with epoxy or enamel paint.
 - 2. Reinforcement: Steel or cast iron, capable of supporting foot traffic for basins installed in foot-traffic areas.
- D. Grout: Post-hardening and volume-adjusting, hydraulic-cement grout. Non-shrink; for interior and exterior applications.
- E. Capacities and Characteristics:
 - 1. Capacity, Diameter, and Depth: As shown on drawings.
 - 2. Inlet and Outlet Quantities, Sizes, and Locations: As shown on drawings.
 - 3. Cover Diameter: As shown on drawings.
 - 4. Manhole Required in Cover: Yes.
 - 5. Vent Size: As shown on drawings.

2.07 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 22 05 13 - Common Motor Requirements for Plumbing Equipment.
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0
- B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. Comply with requirements for excavating, trenching, backfilling, and dewatering specified in Division 31 - Earthwork.

3.02 EXAMINATION

- A. Examine roughing-in for plumbing piping to verify actual locations of sanitary drainage and vent piping connections before sewage pump installation
- B. Examine pumps before installation. Reject pumps that are damaged.

3.03 INSTALLATION

- A. Pump Installation Standards:
 - 1. Comply with HI 1.4 for installation of centrifugal pumps.

3.04 CONNECTIONS

- A. Where installing piping adjacent to equipment, allow space for service and maintenance.
- B. Connect piping to pumps. Install valves that are the same size as piping.
- C. Install shutoff and check valves on pump discharges.
- D. Electrical Power Connections:
 - 1. Connect field electrical power source to each separate pump control panel requiring field electrical power. Coordinate termination point and connection type with Installer.
 - 2. Provide electrical connections between pump control panel, pump control devices, and pumps.
 - 3. Wiring Method: Comply with requirements in Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 4. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
 - 5. Wiring Outside Enclosures: Field-installed wiring outside of enclosures shall be in liquid-tight conduit. Comply with requirements in Sections 26 05 19 - Low-Voltage Electrical Power Conductors and Cables and 26 05 33 - Raceways and Boxes for Electrical Systems.
 - 6. Provide nameplate for each electrical connection indicating electrical equipment designation and circuit number feeding connection. Nameplate shall comply with requirements in Section 22 05 53 - Identification for Plumbing Piping and Equipment.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test, inspect, and adjust components, assemblies, and equipment installations, including connections..
- B. Perform the following tests and inspections:
 - 1. Perform each visual and mechanical inspection.
 - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Tests: Required tests shall include but not be limited to the following:
 - a. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Take amperage reading and turn off immediately if above nameplate value and report to the Engineer.
 - b. Level Switch Operation: Test fill receiver basin to confirm proper on/off operation of pump(s) and level switch(es). Confirm level switch(es) operate pump(s) correctly based on water level.
 - c. Confirm level switch(es) operate freely without binding or catching on obstructions.
 - d. Alarm Tests:
 - 1) Confirm audible and visible alarms activate when pump is held off and high water switch is triggered.
 - 2) Confirm alarm notification on main panel. Where applicable, coordinate with the Building Automation System (BAS) controls provider that alarm conditions generate alarms in the BAS.
 - 3) Confirm audible alarm shuts off when bell silencing switch is on, or pump fault is corrected.
 - 4) Confirm visible alarm shuts off only when pump fault is corrected.
 - 4. Replace damaged and malfunctioning controls and equipment.
- C. Pumps and controls will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.06 STARTUP SERVICE

- A. For sewage ejectors, Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions and perform the following.
 - 2. Remove debris from receiver basins and sumps.
 - 3. Verify that accessory items are properly installed.
 - 4. Check piping connections for tightness.
 - 5. Confirm that water level in the receiver is above the pump minimum submergence level prior to starting pump(s).
 - 6. Verify that pump(s) can be fully removed from the receiver basin and reset in operating position.

3.07 ADJUSTING

- A. Adjust pumps to function smoothly and lubricate as recommended by manufacturer.
- B. Adjust control set points.

3.08 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.
 - 1. Video record the training sessions.
 - 2. Perform not less than one hour of training.
 - 3. Perform instruction sessions showing general operation and maintenance that are coordinated with operation and maintenance manuals. Training shall include the following topics at a minimum:
 - a. Review of locations of equipment and devices.
 - b. Preventative maintenance procedures.
 - c. Testing procedures.
 - d. Manual pump controls.
 - e. Motor and controls replacement procedures.
 - f. Float or other controls adjustment.
 - g. Demonstration of pump operation and alarming.
 - h. Demonstration of pump removal and reset.
 - 4. Obtain Owner sign-off that training is complete.
 - 5. Owner training shall be held at the Project site, or at a location approved by the Owner's Authorized Representative.

END OF SECTION

SECTION 23 05 00

GENERAL HVAC PROVISIONS

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

- A. General HVAC provisions apply to all work performed in Division 23.
- 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. Location of equipment on Drawings is approximate. Plan exact location with respect to site measurements and work of other trades prior to starting work. If measurements differ slightly, modify work. If measurements differ substantially, notify Architect/Engineer and Owner's Authorized Representative prior to fabrication.
- E. Make minor changes in equipment connections and equipment locations as directed or required before rough-in without extra cost.
- F. For products specified by listing one or more manufacturers, followed by "Similar to" and one manufacture's model number, the following requirements apply:
 - 1. Approval of each listed manufacturer is contingent upon that manufacturer having a product which meets the specification, fits in the available space, and is comparable to the listed model.
 - 2. Electrical requirements, duct requirements, pipe connections, and space requirements indicated on drawings are based on the listed model and may not be suitable for all manufacturers listed. Provide revisions required to accommodate the model actually furnished.
- G. For product specified by listing one or more manufacturers, followed by a model number for each manufacturer, the following requirements apply:
 - 1. Provide one of the listed model numbers or an approved substitution.
 - 2. Electrical requirements, duct connections, pipe connections, and space requirements indicated on the Drawings are based on one of the listed models and may not be suitable for all models listed. Provide revisions required to accommodate the model actually furnished.

1.02 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): A federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority.
- B. Owner's Authorized Representative (OAR): Owner's representative with authority to act on Owner's behalf.

- C. Architect/Engineer: The design professional leading the design team and can be either an architect or engineer.
- D. The words furnish, install and provide are defined as follows:
 - 1. Furnish: To supply and deliver to the project ready for installation and in operable condition.
 - 2. Install: To place in final position, complete, anchored, connected in operable condition.
 - 3. Provide: To furnish and install complete. Includes the supply of specified services.
 - 4. When neither furnish, install or provide is stated, provided is implied.

1.03 COORDINATION

- 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/Engineer and secure written approval and agreement on necessary adjustments before start of work.
- B. Coordinate identification systems with other trades. All mechanical systems shall use identical piping, valve, and equipment identification and regulatory signage.

1.04 SUBMITTALS AND SHOP DRAWINGS

- A. See Division 01.
- B. Action Submittal Content
 - 1. Action submittal information not expressly required by the specifications will not be reviewed.
 - 2. Action submittal information shall be provided in sufficient detail to establish conformance with specified requirements. Where submitted literature includes multiple models, features, or options, the specific models, features, or options proposed shall be clearly indicated. Where a brief inspection shows that product data is not complete, the submittal will be rejected without review.
 - 3. Action submittal data shall be clear, concise, legible, and relevant. Where data is not properly organized and contains significant information that is not relevant, the submittal will be rejected without review.
 - 4. Action submittal requirements are listed in individual specification sections. The following definitions apply.
 - a. Materials List: Provide tabular list of materials including specification reference, specification product name, manufacturer, model/part number, and size and/or quantity where appropriate. Do not include supplemental data, except where specifically requested.
 - b. Catalog data: Manufacturer's standard product cut sheet.
 - c. Product Data: Detailed data including dimensions, weight, materials of construction, connections, and all other information needed to confirm that the product conforms to all requirements listed in the individual specification section.
 - d. Performance Data: Capacity, input, output, flow, etc. as required to confirm that the product meets the performance requirements scheduled in the Specifications or on the Drawings.
 - e. Wiring Diagrams: Power and control wiring diagrams.
 - f. Shop Drawings: Construction drawings of items manufactured specifically for this project including dimensions, construction details, weights, and additional information to identify the physical features of the system or piece of equipment.
 - g. Installation Instructions

- h. Special Requirements Listed: Additional requirements indicated in individual specification sections.

C. Delegated Design

- 5. The Contractor shall provide delegated design services where indicated in the Contract Documents and obtain necessary approval from the AHJ. The Contractor shall be responsible for the design, calculations, submittals, permits, fabrication, transportation and installation of these Delegated Design components. The Contractor is responsible to submit all Delegated Design documents required for approvals by regulatory agencies for each item of delegated design work.
- 6. Delegated design work shall be performed by a registered professional engineer or architect specializing in the associated work and registered in State in which the work is performed where required by the AHJ or as specified herein.
- 7. Comply with requirements of the AHJ over the Work current at the time of submission. The Contractor is responsible to coordinate and submit all material required by the AHJ so review and process of submittals and permits will not adversely affect the construction schedule. Each Delegated Design item requiring review by the AHJ must be provided by the Contractor and all fees and costs associated therewith shall be the Contractor's responsibility at no additional cost to the Owner.
- 8. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - a. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
- 9. Delegated-Design Services Certification: In addition to shop drawings, product data, and other required submittals, submit digitally signed PDF electronic file, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.05 QUALITY ASSURANCE

- A. All materials and equipment provided hereunder shall be installed and started in complete conformance with the manufacturer's recommendations.
- B. Asbestos products or equipment or materials containing asbestos shall not be used.
- C. Certify that each welder has passed the American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.

1.06 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.
- B. Materials and equipment provided hereunder shall be rated for the service conditions of the system to which they are connected including but not limited to temperature, pressure, and humidity.

1.07 CODES AND 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 SEQUENCING

- A. Testing, adjusting, and balancing of HVAC systems will begin after commissioning construction checks and equipment start-up are complete and Systems Ready to Balance Checklist forms have been executed and submitted.
- B. Submit control verification reports three weeks after Substantial Completion.
- C. Submit draft operations and maintenance manuals to Owner's Authorized Representative 30 days prior to substantial completion.
- D. Operator training shall be performed prior to Substantial Completion, or as otherwise approved by the Owner's Authorized Representative.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in a clean and dry place.
- B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.
- C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.
- D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.
- E. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
- F. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remove coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.
- G. Replace installed products damaged during construction.

1.10 TEMPORARY SERVICES

- A. Provide in accordance with Division 01 as required for completion of work.
- B. Maintain existing systems operational. Owner will be responsible to operate and maintain existing equipment during the course of the project. However, any damage to existing equipment resulting directly from work under this Contract shall be repaired by the Contractor at no expense to Owner.
- C. All mechanical systems currently operating including HVAC equipment and controls, which serve Owner occupied areas, must be maintained operational during construction. It is the responsibility of the Contractor to provide temporary facilities as required to maintain

operation. If any system currently in use must be turned off to perform work, permission must be obtained, and owner notified prior to performing any work.

1.11 OPERATIONS AND MAINTENANCE MANUALS

- A. Furnish operation and maintenance data for project, as described herein.
- B. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF files.
 - 1. Include a directory of all subcontractors and maintenance contractors with names, addresses, and telephone numbers, indicating the area of responsibility for each.
 - 2. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 3. 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.
 - 4. Manual Content: Manuals shall contain complete information for each item of mechanical, electrical or other operating equipment. Include as applicable:
 - a. Manufacturer's instructions for installation, startup, operation, inspection, and maintenance
 - b. Lubrication schedules
 - c. Performance capacity
 - d. Final approved product submittals for each product included in project.
 - 1) Mark the model actually provided where the literature covers more than one model. Include all submittal data corrected to "as-built" conditions within the manual.
 - 2) Parts list
 - e. Maintenance schedules
 - f. 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.
 - 5. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

1.12 RECORD DRAWINGS

- A. Provide record "as-built" drawings in accordance with Division 01 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. Alternately, provide electronically using .pdf markup of contract drawings.

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 equipment and materials shall be of one manufacturer.
- B. Equipment used as the basis of design is scheduled on Drawings or designated in product specifications. If Contractor chooses to use equipment that is not the basis of design, Contractor is responsible for all re-design and construction costs associated with variations in arrangement, dimension, or capacity. Such work may include, but is not limited to, changes to facility structure or dimensions and revisions to associated mechanical and electrical systems needed to provide equal system performance and maintainability.

2.02 ELECTRICAL EQUIPMENT

- A. Electrical Disconnect Switch: Electrical disconnect switches specified for mechanical equipment shall conform to OSHA Lock-out/Tag-out requirements.
- B. All electrical equipment shall be listed as approved for its application by the Underwriters Laboratory or other testing agency approved by the State of Oregon Electrical and Elevator Board. Approval indicates agency meets testing standard requirements for electrical safety required by Oregon Revised Statutes 479.510 through 479.855 and Oregon Administrative Rules.
- C. Enclosure: Provide the following electrical equipment enclosure types.
 - 1. NEMA 1: Dry, enclosed locations where the ambient temperature will not be outside of the VFD temperature ratings.
 - 2. NEMA 4, or 4X: Swimming pool mechanical rooms and other mechanical spaces where more sustained water spray is possible

2.03 SPECIAL TOOLS AND LUBRICANTS

- A. Furnish and turn over to Owner's Authorized Representative, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.

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/Engineer prior to work.
- B. Provide clearances for maintenance access as indicated on Drawings or as recommended by manufacturer. If access requirements shown on Drawings conflict with manufacturer's recommendations, provide larger clearance of the two.
- C. If equipment location shown on Drawings does not allow required access, notify Architect/Engineer prior to start of work.

- D. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to Architect/Engineer for resolution prior to starting work.
- E. Where ladder access is required to service elevated components, provide an installation that provides for sufficient access within ladder manufacturer's written instructions for use.
- F. Comply with OSHA regulations.

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. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.
- C. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
- D. 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.
- E. 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.
- F. Work in Existing Building: Cut required openings through existing masonry and reinforced concrete using diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the Owner's Authorized Representative. Locate openings that will least affect structural slabs, columns, ribs, or beams. Refer to the Architect/Engineer for determination of proper design for openings through structural sections and obtain layout approval prior to cutting or drilling into structure. After Architect/Engineer approval, carefully cut opening through construction no larger than absolutely necessary for the required installation.
- G. Switchgear Drip Protection: Do not install piping above electrical switchgear.

3.03 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.

3.04 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.

3.05 START UP

- A. The Mechanical Contractor shall be responsible for proper operation of all systems and shall coordinate startup procedures, calibration and system checkout. System operational problems shall be diagnosed and corrected as required for system operation prior to Substantial Completion inspection.
- B. Verify that piping has been flushed and cleaned prior to startup.

3.06 DEMONSTRATION

- A. General: After installation is complete, demonstrate to Engineer and Owner's Authorized Representative satisfaction as being complete and operational and entirely in conformance with Contract Documents.
- B. Preparation: Prior to demonstration, submit check-off list indicating completeness of submittals and certificates of compliance for review to Owner's Authorized Representative. Operate completed system for one week. Verify that control verification is complete and verification report has been approved by Architect/Engineer.
- C. Arrange for demonstration with Owner's Authorized Representative, Engineer, required factory technicians, and installer at least one week in advance of demonstration.

3.07 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 building HVAC systems and equipment provided for this project for a minimum of one hour on-site to instruct Owner in operation and maintenance of systems and equipment. This figure does not include additional training noted under individual specification sections. Contractor shall keep a log of this instruction including date, times, subjects, and those present and shall present such log when requested by Engineer. Contractor shall coordinate training with Owner's Project Manager and provide a schedule for training minimum two-weeks prior to Substantial Completion. All training shall be complete 30-days after Substantial Completion.

END OF SECTION

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, squirrel-cage induction and electrically commutated motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.02 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.01 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.

2.02 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40°C and at altitude of 3,300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 POLYPHASE INDUCTION MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Premium efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15 unless listed otherwise under section where motor is provided.
- D. Rotor: Random-wound, squirrel cage.
- E. Bearings: Re-greaseable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- F. Temperature Rise: Match insulation rating.
- G. Insulation: Class F.

- H. Code Letter Designation:
 - 1. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- I. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.
- J. Enclosure Type: 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 smoke exhaust fans, fire pumps and similar equipment.
 - 4. Motors 10 HP and larger.
- K. Additional Requirements for Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Inverter Duty as defined in NEMA MG 1 with Class F temperature rise; Class H insulation.
 - 2. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 3. Maximum RPM: 3600 rpm minimum, or 150% of as design motor speed, whichever is greater.
 - 4. Speed Ratio:
 - a. Constant load applications: 4:1, except 1000:1 where high turndown motor is required.
 - b. Variable torque applications: 20:1, except 1000:1 where high turndown motor is required.
 - 5. Bearing Protection Ring: For motors controlled by variable frequency drives, provide maintenance free, conductive microfiber, shaft grounding ring with a minimum of two rows of circumferential microfibers to discharge electrical shaft currents within the motor and/or its bearings. AEGIS SGR or approved equal.

2.04 SINGLE-PHASE INDUCTION MOTORS

- A. Motors larger than 1/20 HP shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Pre-lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify motor mounts are compatible with motor frame.

3.02 INSTALLATION

- A. Motors Used with Variable Frequency Controllers: Arrange location of motor, variable frequency controller and electrical wiring to ensure the distance from motor to inverter does not exceed manufacturer recommended maximum length.

3.03 APPLICATION

- A. Induction Motors
 - 1. Motors Less Than 1/2 HP: Single-Phase
 - 2. Motors 1/2 HP and larger: Polyphase.

END OF SECTION

SECTION 23 05 17

SLEEVES, SLEEVE SEALS, AND ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes sleeves, sleeve seals, escutcheons, and related materials.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.01 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

2.02 MECHANICAL SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Garlock
 - 2. Metraflex Company.
- B. Basis of Design:
 - 1. Standard Temperature: Similar to Garlock Linkseal Model C.
 - 2. High Temperature: Similar to Garlock Linkseal Type T.
- C. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Rubber seal element material:
 - a. Standard temperature: EPDM rubber.
 - b. High Temperature: Silicone rubber
 - 3. Temperature range:
 - a. Standard Temperature: -40°F to 250°F.
 - b. High Temperature: -67°F to 400°F.
 - 4. Pressure Plates: Zinc dichromate plated carbon-steel.
 - 5. Pressure resistance rating: 40 feet w.c.
 - 6. Connecting Bolts and Nuts: Carbon-steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.03 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Non-shrink; recommended for interior and exterior applications.

- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.01 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide annular clear space between piping and concrete slabs and walls recommended by manufacturer.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. See Section 23 05 00 – General HVAC Provisions.

3.02 MECHANICAL SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves or core-drilled holes in exterior concrete walls at piping entries into building and at manhole entries.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.03 SLEEVE AND MECHANICAL SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls below Grade and Vault Penetrations:
 - a. Mechanical seal system.

END OF SECTION

SECTION 23 05 19

METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Pressure gages and gage attachments
 2. Test plugs

1.02 ACTION SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 23 05 00 – General HVAC Provisions. Submittal requirements indicated by column number designation as follows:
1. Materials List
 2. Catalog Data
 3. Product Data
 4. Performance Data
 5. Wiring Diagrams
 6. Shop Drawings
 7. Installation Instructions
 8. Special Requirement listed herein.

PRODUCT TABLE	1	2	3	4	5	6	7	8
Pressure Gauges and Gauge Attachments		X						
Test Plugs		X						

1.03 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.01 PRESSURE GAGES AND GAGE ATTACHMENTS

- A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ashcroft Inc.
 - b. Marsh Bellofram
 - c. Palmer Wahl Instrumentation Group
 - d. Trerice, H. O. Co.
 - e. Weiss Instruments, Inc.
 2. Standard: ASME B40.100.
 3. Case: Liquid-filled type; cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
 4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is required.

6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Non-reflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Double strength glass or plastic.
10. Ring: Metal, Friction fit.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.
12. 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.

B. Gage Attachments

1. Snubbers: ASME B40.100, brass; with NPS 1/4, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.
2. Siphons: Loop-shaped section of brass pipe with NPS 1/4 pipe threads.
3. Valves: Brass ball, with NPS 1/4, ASME B1.20.1 pipe threads.

2.02 TEST PLUGS

- A. Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
1. Sisco Manufacturing Company, Inc.
 2. Trerice, H. O. Co.
 3. Watts, a Watts Water Technologies company
 4. Weiss Instruments, Inc.
- B. Description:** Test-station fitting made for insertion into piping tee fitting.
- C. Body:** Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
- D. Thread Size:** NPS 1/4, ASME B1.20.1 pipe thread.
- E. Minimum Pressure and Temperature Rating:** 500 psig at 200°F.
- F. Core Inserts:** Chlorosulfonated polyethylene synthetic acceptable for air, gas, oil, and water. EPDM self-sealing rubber acceptable for air and water only.

PART 3 - EXECUTION

3.01 INSTALLATION

- A.** Install all equipment in accordance with manufacturer's recommendations.
- B. Pressure Gauges**
1. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
 2. Install valve and snubber in piping for each pressure gage for fluids (except steam).
 3. Sight Install valve and syphon fitting in piping for each pressure gage for steam.
- C. Test Plugs**
1. Install test plugs in piping tees.
 2. 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.
- 3. Arrangement:
 - a. Install so temperature probe and pressure gauge probe can easily be inserted and removed with no obstruction.

3.02 CONNECTIONS

- A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.03 ADJUSTING

- A. After installation, calibrate meters according to manufacturer's written instructions.
- B. Adjust faces of meters and gages to proper angle for best visibility.

END OF SECTION

SECTION 23 05 23
VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Valves for HVAC service.

1.02 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. HPS: High Pressure Steam. Steam pressure greater than 15 psig.
- D. LPS: Low Pressure Steam. Steam pressure 15 psig and less.
- E. NRS: Non-rising stem.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.03 ACTION SUBMITTALS

- A. Catalog Data: For each type of valve.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set angle and globe valves closed to prevent rattling.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B1.20.1 for threads for threaded-end valves.

2. ASME B16.1 for flanges on iron valves.
 3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 4. ASME B31.1 for power piping valves.
 5. ASME B31.9 for building services piping valves.
- C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.
- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- E. Valve Pressure and Temperature Ratings: Not less than indicated and as required for maximum system pressures and temperatures. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valves in Insulated Piping:
1. Include 2-inch stem extensions.
 2. Ball Valves:
 - a. Extended operating handle of nonthermal-conductive material, and protective sleeves that allow operation of valves without breaking the vapor seals or disturbing insulation.
 - b. Memory stops shall be fully adjustable after insulation is applied.
 3. Gate Valves:
 - a. RS Valves in Insulated Piping: Provide 2-inch stem extensions.
- H. Valve Bypass and Drain Connections: MSS SP-45.

2.02 GATE VALVES

- A. NPS 2 and Smaller.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Jenkins Valves; Crane Energy Flow Solutions.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Stockham; Crane Energy Flow Solutions.
 2. Class 125, Bronze Gate Valve:
 - a. Standard: MSS SP-80, Type 1. Rising stem or non-rising stem as indicated.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - d. Ends: Threaded.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron or bronze.
- B. NPS 2-1/2 and Larger:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Apollo Valves.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Jenkins Valves; Crane Energy Flow Solutions.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Stockham; Crane Energy Flow Solutions.
 - 2. Class 125, Iron Gate Valve:
 - a. Standard: MSS SP-70, Type I. Rising stem or non-rising stem as indicated.
 - b. NPS 2-1/2 to NPS 12, CWP Rating: 250 psig.
 - c. NPS 14 to NPS 24, CWP Rating: 150 psig.
 - d. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - e. Ends: Flanged.
 - f. Trim: Bronze.
 - g. Disc: Solid wedge.
 - h. Packing and Gasket: Asbestos free.
- C. NPS 2-1/2 and Larger, with bypass valve:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Velan
 - b. Dervos Valves.
 - 2. Class 125, Iron Gate Valve:
 - a. Standard: MSS SP-70, Type I. Rising stem.
 - b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
 - c. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - d. Ends: Flanged.
 - e. Bypass gate valve with piping attached to ports on valve body on both sides of valve gate.
 - f. Trim: Bronze.
 - g. Disc: Solid wedge.
 - h. Packing and Gasket: Asbestos Free

2.03 GLOBE VALVES

- A. NPS 2 and Smaller:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - 2. Class 125, Bronze Globe Valve
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded.
 - e. Stem and Disc: PTFE.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron, bronze, or aluminum.
- B. NPS 2-1/2 and Larger:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Jenkins Valves; Crane Energy Flow Solutions.
 - e. Milwaukee Valve Company.
 - f. Stockham; Crane Energy Flow Solutions.
2. Class 125, Iron Globe Valve
 - a. Class 125
 - b. Standard: MSS SP-85, Type I.
 - c. CWP Rating: 200 psig.
 - d. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - e. Ends: Flanged.
 - f. Trim: Bronze.
 - g. Packing and Gasket: Asbestos free.
 - h. Operator: Handwheel or chainwheel.

2.04 BALL VALVES

- A. NPS 2 and Smaller:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves.
 - b. Hammond Valve.
 - c. Jenkins Valves; Crane Energy Flow Solutions.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - f. Stockham; Crane Energy Flow Solutions.
 - g. Watts; a Watts Water Technologies company.
 2. Bronze Ball Valves with Bronze or Brass Trim:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE.
 - h. Stem: Bronze.
 - i. Ball: Chrome-plated brass.
 - j. Port: Full.
 3. Steel Ball Valve with Stainless-Steel Trim:
 - a. Standard: MSS SP-72.
 - b. CWP Rating: 720 psig.
 - c. Body Design: Split body.
 - d. Body Material: Carbon steel, ASTM A 216, Type WCB.
 - e. Ends: Flanged.
 - f. Seats: PTFE.
 - g. Stem: Stainless-steel.
 - h. Ball: Stainless-steel.
 - i. Port: Full.

2.05 CHECK VALVES

- A. NPS 2 and Smaller:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Jenkins Valves; Crane Energy Flow Solutions.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Stockham; Crane Energy Flow Solutions.
 2. Class 150, Bronze Swing Check Valve
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 300 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: Bronze.
- B. NPS 2-1/2 and Larger
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hammond Valve.
 - b. Metraflex Company (The).
 - c. Milwaukee Valve Company.
 - d. Mueller Steam Specialty.
 - e. NIBCO INC.
 - f. Spence Engineering Company, Inc.
 2. All Service:
 - a. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - 1) Standard: MSS SP-125.
 - 2) Why is this 200 psi and not 125. 200 seams excessive
 - 3) NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
 - 4) NPS 14 to NPS 24, CWP Rating: 150 psig.
 - 5) Body Material: ASTM A 126, gray iron.
 - 6) Style: Compact wafer.
 - 7) Seat: Bronze.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

- A. Install valves with unions or flanges to isolate each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.
 - 2. Center-Guided Check Valves: In horizontal or vertical position, between flanges.
 - 3. Install check valves a minimum of five pipe diameters away from changes of direction, pumps, or equipment that can generate turbulent flow in piping.

3.03 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL VALVE APPLICATIONS

- A. Drain Valves:
 - 1. Where drain valves are required, include hose end connection and cap with EDPM gasket.
 - 2. Provide drain down valves at the low point in each zone, area of service, or floor level.
 - 3. Provide drain down valves to drain equipment.
- B. Gauge Stop Valves:
 - 1. Size to match gauge connection.
- C. Strainer Blowdown Valves:
 - 1. Match blowdown connection.
 - 2. Provide hose end connection and cap with EDPM gasket for valves 1-inch and below.
- D. Provide check valve on compressed air piping downstream of isolation valve and before connecting to building air compressor branch connection.
- E. Provide valves for isolation of services as shown on Drawings and at the following locations:
 - 1. Where piping penetrates the building envelope.
 - 2. Where piping enters the building from a tunnel.
 - 3. At branch connections from piping risers at each floor.
 - 4. Major branches and branches to remote equipment or fixtures for all supply and return systems.
 - 5. As required to individually isolate all equipment and maintainable devices including automatic air vents and hydronic control valves.
 - 6. Where piping penetrates mechanical room walls. Locate valve inside mechanical room.

7. Branch connections for utility systems including piping in utility tunnels.

F. Provide valves where recommended by equipment manufacturer's installation instructions.

3.05 VALVE SCHEDULE

A. If valve type shown on drawings is different than type indicated below, notify Engineer prior to ordering to verify type.

B. High Pressure Steam and Condensate Return.

1. Steam Shutoff Service.

a. NPS 2 and Smaller: Select one of the following:

1) Class 125, RS, Iron Gate Valves

2) Steel Ball Valves with Stainless-Steel Trim:

b. NPS 2-1/2 and Larger Class 125, NRS, Iron Gate Valve.

1. Condensate Shutoff Service:

a. NPS 2 and Smaller: Select one of the following:

1) Class 125, RS, Iron Gate Valve

2) Steel Ball Valves Stainless-Steel Trim

b. NPS 2-1/2 and Larger: Class 125, RS, Iron Gate Valve.

2. Throttling Service, Supervised Warm-up By-pass

a. NPS 2 and Smaller: Class 125 Cast Iron Globe Valve.

b. NPS 2-1/2 and Larger: Class 125 Iron Globe Valve.

3. Check Valve Service:

a. NPS 2 and Smaller: Class 300, Iron Swing Check Valve

b. NPS 2-1/2 and Larger: Class 250, Iron Swing Check Valve.

4. Drain, Gauge Stop, Steam Strainer Blow Down, Condensate Strainer Blow Down:

a. Class 125, RS, Iron Gate Valve

b. Steel Ball Valves with Stainless-Steel Trim.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. Specification 230548: Vibration and Seismic Controls for HVAC.

1.02 SUMMARY

- A. Design and installation of hangers and supports for HVAC piping and equipment provided in Division 23. Exceptions include equipment whose structural attachment has been designed by the design team structural engineer.

1.03 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.
- B. ASME: American Society of Mechanical Engineers
- C. MFMA: Metal Framing Manufacturers Association
- D. ASCE: American Society of Civil Engineers
- E. ASTM: American Society for Testing and Materials

1.04 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Supports for multiple pipes, including pipe stands, shall be capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Equipment supports shall be capable of supporting combined operating weight of supported equipment and connected systems and components.

1.05 ACTION SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 23 05 00 – General HVAC Provisions Submittal requirements indicated by column number designation as follows:
 - 1. Materials List
 - 2. Catalog Data
 - 3. Detailed Data
 - 4. Performance Data
 - 5. Wiring Diagrams
 - 6. Shop Drawings
 - 7. Installation Instructions

8. Special Requirement listed herein.

PRODUCT TABLE	1	2	3	4	5	6	7	8
Pipe Hangers and Supports		X						
Thermal Hanger Shield Inserts		X						

B. Shop Drawings:

1. Plans showing type and location of supports and assemblies. Provide full or half size copies of piping plans from the Contract Documents or coordination drawings, showing location and type of each support component to be installed. Drawings shall consist of mechanically reproduced copies of the Contract Documents, or new drawings custom drafted specifically for the Work of this Project. Each drawing shall be printed on a single sheet.
2. Detail fabrication and assemblies for support assemblies including metal framing systems, equipment supports, trapeze hangers, pipe support stands to comply with performance requirements and design criteria. Assemblies may be pre-engineered or custom designed for the application.
3. Detail anchorages and attachments to structure. Where walls, floors, slabs or supplementary steel work are used for support, details of acceptable attachment methods must be included and approved before the condition is accepted for installation. Drawings must include spacing and static loads at all attachment and support points.

C. Delegated-Design Submittal:

1. Provide a delegated submittal package comprised of drawings, details, and calculations signed and sealed by an engineer specializing in the associated work and registered in Oregon. Submittals shall include device dimensions, placement, and attachment and anchorage requirements.

1.06 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless-steel.

2.02 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.03 METAL FRAMING SYSTEMS

- A. Manufactured Metal Framing Systems:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. B-line, an Eaton business
 - b. Thomas & Betts Corporation, a member of the ABB Group
 - c. Unistrut, part of Atkore International
 - 2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
 - 3. Standard: MFMA-4.
 - 4. Channels: Continuous slotted steel channel with in-turned lips.
 - 5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - 6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
 - 7. Metallic Coating: Pre-Galvanized Hot Dipped, ASTM A653, 0.75 MIL
 - 8. Paint Coating: Vinyl.

2.04 INSULATION INSERTS

- A. General: Insulation insert for use with MSS Type 40 protection shield
- B. Insulation-Insert Material for Cold Piping:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Foamglas
 - 2. ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.
 - 3. ASTM C1126 Type III phenolic foam with factory laminated ASJ.
 - a. 1-1/2" to 2-1/2" pipe size: 32 psi at load point.
 - b. 3" to 6" pipe size: 85 psi at load point.
 - c. 8" to 12" pipe size: 135 psi at load point
- C. Insulation-Insert Material for Hot Piping, 200 °F and less:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Insultherm
 - b. Johns Manville
 - c. Resolco, Inc.
 - 2. ASTM C1126 Type III phenolic foam with factory laminated ASJ.
 - a. Maximum Temperature: 220°F
 - b. Maximum Load:
 - 1) 1-1/2" to 2-1/2" pipe size: 32 psi at load point.
 - 2) 3" to 6" pipe size: 85 psi at load point.
 - 3) 8" to 12" pipe size: 135 psi at load point
- D. Insulation-Insert Material for Hot Piping, greater than 200 °F:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville
 - b. Thermal Pipe Shields
 2. Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.05 FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.06 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
1. Properties: Non-staining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- D. Fastener System Installation:
1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying Coordinate with Section 23 05 48 – Vibration and Seismic Controls for interrelated work.
- H. Install building attachments within concrete slabs or to structural steel where possible. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes.
- K. Insulated Piping:
 - 1. Piping Operating Above 180 degrees:
 - a. Steel Piping 4-inches and Larger: Provide MSS Type 39 Protective Saddle.
 - b. All Other Piping 1-1/2-inches and larger: Provide Insulation Insert with MSS Type 40 protection shield.
 - c. All Piping 1-1/4-inches and smaller: Provide MSS Type 40 protection shield.
 - 2. Piping Operating less than 180 degrees:
 - a. All Piping 1-1/2-inches and Larger: Provide Insulation Insert with MSS Type 40 protection shield.
 - b. All Piping 1-1/4-inches and smaller: Provide MSS Type 40 protection shield.
 - 3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS (Nominal Pipe Size) 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 - 4. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - 5. Insulation Inserts: Same thickness as piping insulation.

3.02 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.03 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.04 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.05 HANGER SPACING

A.

PIPING SPACING TABLE	Maximum Horizontal Span	Maximum Vertical Spacing
Carbon Steel and Stainless-steel		
1-1/2 inch to 2-1/2 inch	10 feet	15
3 inch and larger	12 feet	15

3.06 ROD SIZES

- A. Select rod diameter to not exceed the maximum safe load listed in Table 2 of MSS SP-58-2009.

3.07 HANGER AND SUPPORT TYPE SCHEDULE

- A. Single Pipe, Hung and Uninsulated
 1. NPS ½ to NPS 3: Adjustable Steel Band Hanger, MSS Type 7.
 2. NPS 4 and Larger: Steel Clevis, MSS Type 1.
- B. Single Pipe, Hung and Insulated
 1. Operating Temperature Less Than 140 Degrees: Steel Clevis, MSS Type 1
 2. Operating Temperature 140 Degrees and Above.
 - a. NPS ½ to NPS 2: Steel Clevis, MSS Type 1.
 - b. NPS 3 and Larger: Adjustable Roller Hanger: Type 43.
- C. Multiple Pipe Trapeze or Pipe Rack: Trapeze Hanger, MSS Type 59.
 1. Uninsulated Piping: Steel Strap.
 2. Insulated Piping: Adjustable Roller, MSS Type 43.
- D. Single Pipe Floor Support: Adjustable Pipe Support Saddle: MSS Type 38.

- E. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- F. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- G. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
- H. To eliminate the need for seismic restraint, for piping installation where the distance from the top of the pipe to the structure is 12 inches or less for the entire run, select hanger-rod and building attachments to allow pipe movement without stress on hangers and attachments.
- I. Hanger-Rod Attachments: Unless otherwise indicated, provide the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450°F piping installations.
 - 3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - 4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450°F piping installations.
- J. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications.
- K. Comply with MFMA-103 for metal framing system selections and applications.
- L. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Pipe labels.
 - 2. Valve tags.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.03 COORDINATION

- A. Coordinate with Division 22. Match manufacturer, type, and style of identification used.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Marking Services, Inc.
 - 3. Seton Identification Products.

2.02 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.
- B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.03 VALVE TAGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Brady Corporation.
 2. Marking Services Inc.
 3. Seton Identification Products.
- B. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 1. Tag Material: Polished brass, 0.025-inch aluminum and having predrilled or stamped holes for attachment hardware.
 2. Fasteners: Brass wire-link chain or S-hook.
- C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.03 PIPE LABEL INSTALLATION

- A. Pipe Label Locations: Locate pipe labels where piping is exposed in machine rooms; accessible maintenance spaces such as shafts, and tunnels; and exterior exposed locations as follows:
 1. Near each valve and control device.
 2. Near each flange.
 3. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
- B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- C. Pipe Label Color Schedule: Letter and background color in accordance with ANSI A13.1.

3.04 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, faucets, convenience and lawn-watering hose connections, and isolation valves for HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves with captions as indicated in the following subparagraphs:
 1. Valve-Tag Information: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch valve tag numbers.

END OF SECTION

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes insulating of above grade HVAC piping.

1.02 ACTION SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 23 05 00 – General HVAC Provisions.
 - 1. Catalog Data.
 - 2. For each type of product listed, provide thermal conductivity and water-vapor permeance.

1.03 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.04 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. Surface-Burning Characteristics: Products shall have flame spread and smoke developed ratings based on test procedures [and listed and labeled] in accordance with NFPA-255 and UL 723. Rating shall be indicated on the product or on the shipping containers.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.06 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment.
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.07 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- E. Insulation jacket material shall be paintable where painting of the insulation jacket is specified.
- F. Calcium Silicate:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Industrial Insulation Group
 - b. Johns Manville, Berkshire Hathaway Company
 - c. Owens Corning
 - 2. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
 - 3. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.
- G. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville, a Berkshire Hathaway company
 - b. Knauf Insulation
 - c. Manson Insulation Inc.
 - d. Owens-Corning.
 - 2. Type I, 850°F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- H. Mineral-Wool, Preformed Pipe Insulation:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville MinWool-1200

- b. Rockwool ProRox PS 960
- 2. Type I, 1200°F Materials: Mineral wool fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Field-applied jacket requirements are specified in "Field-Applied Jackets" Article.
- I. Pre-manufactured Removable Insulation Systems
 - 1. General: Removable and Re-useable insulation covers, custom engineered and manufactured for the specific application. Similar to Fit Tight Covers.
 - 2. Construction
 - a. Jacket and Liner: Silicon Impregnated Fiberglass Fabric
 - b. Insulation: 1-inch Type E Glass Mat
 - c. Fastening: 1-inch straps and stainless-steel D-rings.
 - d. Thread: Kevlar/stainless steel thread.

2.02 ADHESIVES

- A. Materials compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800°F.
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- D. ASJ Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- E. PVC Jacket Adhesive: Compatible with PVC jacket.

2.03 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180°F.
 - 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 - 4. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 - 2. Service Temperature Range: Minus 50 to plus 220°F.
 - 3. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 - 4. Color: White.

2.04 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.05 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. Metal Jacket:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. ITW Insulation Systems; Illinois Tool Works, Inc.
 - 2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and Kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 2.5-mil- thick polysurlyn.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.06 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 1. Width: 3 inches.
 - 2. Thickness: 11.5 mils.
 - 3. Adhesion: 90 ounces force/inch in width.
 - 4. Elongation: 2 percent.
 - 5. Tensile Strength: 40 lbf/inch in width.
 - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 - 1. Width: 2 inches.
 - 2. Thickness: 3.7 mils.
 - 3. Adhesion: 100 ounces force/inch in width.
 - 4. Elongation: 5 percent.
 - 5. Tensile Strength: 34 lbf/inch in width.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- C. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- D. Install multiple layers of insulation with longitudinal and end seams staggered.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Where piping connections, accessories, or control components are attached to piping with an operating temperature less than 60°F, insulate piping and projections where condensation may occur.
 1. Piping that has constant or intermittent flow: Insulate to match connected piping.
 2. Piping that does not have fluid flow including connections, nipple, wells or other accessories that penetrate insulation and are constructed from materials other than stainless steel, copper, brass, or plastic shall be insulation up to connected devices including pressure relief valves, field mounted control devices, pressure sensing tubing.
- K. Apply insulation and jacket manufacturer approved adhesives, mastics, and sealants at recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.04 PENETRATIONS

- A. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

3.05 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover for removable basket flange. For below-ambient services, provide a design that maintains vapor barrier.
 - 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 - 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Installation shall conform to the following:
 - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

3.06 INSTALLATION OF CALCIUM SILICATE INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
 2. Install two-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
 3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.
- B. Insulation Installation on Pipe Flanges:
 1. Install preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 4. Finish flange insulation same as pipe insulation.
- C. Insulation Installation on Pipe Fittings and Elbows:
 1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 2. When preformed insulation sections are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
 3. Finish fittings insulation same as pipe insulation.
- D. Insulation Installation on Valves and Pipe Specialties:
 1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 2. Install insulation to flanges as specified for flange insulation application.
 3. Finish valve and specialty insulation same as pipe insulation.

3.07 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
 4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 4. Install insulation to flanges as specified for flange insulation application.

3.08 INSTALLATION OF MINERAL WOOL INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
- B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-wool blanket insulation.
 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 4. Install insulation to flanges as specified for flange insulation application.

3.09 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.
1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.10 FINISHES

- A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below.
1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: White
- C. Do not field paint aluminum or stainless-steel jackets.

3.11 PIPING INSULATION THICKNESS

- A. General
1. For piping smaller than 1-1/2 inches and located in partitions within conditioned spaces, reduction of thickness by 1-inch permitted to a thickness not less than 1-inch.
- B. Insulation installed overheat trace for freeze protection: 1-inch thickness
- C. Serviceable components, connections, and couplings.
1. Install Pre-manufactured Removable Insulation Systems at the following:
 - a. Valves, manual and automatic.
 - b. Flanges and unions requiring access to allow equipment service.
 - c. Mechanical couplings requiring access to allow equipment service.

D. Calcium Silicate Insulation Thickness
 1.

CALCIUM SILICATE					
FLUID NORMAL OPERATING TEMPERATURE (°F)	NOMINAL PIPE OR TUBE SIZE (inches)				
	<1	1 to < 1.5	1.5 to < 4	4 to < 8	>= 8
251-350	5	5	5	5	5
201-250	2.5	2.5	2.5	2.5	2.5
141-200	1.5	1.5	1.5	1.5	1.5
105-140	1	1	1.5	1.5	1.5
40-60	0.5	0.5	1	1	1
<40	0.5	1	1	1	1.5

E. Mineral Fiber Insulation
 1.

FIBERGLASS					
FLUID NORMAL OPERATING TEMPERATURE (°F)	NOMINAL PIPE OR TUBE SIZE (inches)				
	<1	1 to < 1.5	1.5 to < 4	4 to < 8	>= 8
>350	5	5	5	5	5
251-350	3.5	4.5	4.5	4.5	4.5
201-250	2.5	2.5	2.5	3	3
141-200	1.5	1.5	2	2	2
105-140	1	1	1.5	1.5	1.5
40-60	0.5	0.5	1	1	1
<40	0.5	1	1	1	1.5

F. Mineral Wool Insulation
 1.

FIBERGLASS					
FLUID NORMAL OPERATING TEMPERATURE (°F)	NOMINAL PIPE OR TUBE SIZE (inches)				
	<1	1 to < 1.5	1.5 to < 4	4 to < 8	>= 8
>350	3.5	4	4	4.5	4.5
251-350	3	3	3.5	4	4
201-250	2	2	2	2.5	2.5

3.12 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. For all systems with an operating temperature that may be below ambient conditions, a vapor barrier must be maintained.

- C. For piping smaller than 1-1/2 inches and located in partitions within conditioned spaces, reduction of thickness by 1-inch is permitted to a thickness not less than 1-inch.
- D. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.

3.13 INDOOR PIPING INSULATION SCHEDULE

- A. Piping located in tunnels. Steam and Steam Condensate: Normal operating temperature 260°F. Select one of the following:
 - 1. Mineral Fiber
 - 2. Mineral Wool
- B. Piping located in site vaults. Steam and Steam Condensate: Normal operating temperature 260°F:
 - 1. Calcium Silicate

3.14 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping: Piping located in mechanical rooms within 6-feet of floor level, across passageways, or in site located vaults:
 - 1. Aluminum, Corrugated: 0.024 inch thick.

END OF SECTION

SECTION 23 09 23

BUILDING AUTOMATION SYSTEMS FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

- A. Work hereunder includes a complete and operational, fully tested, distributed logic, building automation system (BAS) for control of systems and equipment specified in Divisions 22 and 23. Associated work includes but is not limited to:
1. Communication, control wiring, and power wiring as required.
 2. Control sequences as specified in Section 23 09 29 – BAS Sequence of Operations for HVAC.
 3. Other materials and devices not shown as part of other work but necessary to provide mechanical and electrical system control and monitoring sequences specified.

1.02 RELATED SECTIONS

- A. Section 23 09 29 – BAS Sequence of Operations for HVAC

1.03 SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 23 05 00 – General HVAC Provisions. Submittal requirements indicated by column number designation as follows:
1. Materials List
 2. Catalog Data
 3. Product Data
 4. Performance Data
 5. Wiring Diagrams
 6. Shop Drawings
 7. Installation Instructions
 8. Special Requirements listed herein.

PRODUCT TABLE	1	2	3	4	5	6	7	8
All Products This Section								X

- B. Special Requirements:
1. Provide all control submittals including Sections 23 09 23 – Building Automation Systems for HVAC, 23 09 25 – BAS Field Mounted Devices for HVAC, and 23 09 29 – BAS Sequence of Operations for HVAC as a single package.
 2. Submittals prior to starting work:
 - a. Submit in accordance with Division 01 and Section 23 05 00 – General HVAC Provisions within 6 weeks of project award.
 - b. Controlled Systems:
 - 1) Provide an instrumentation list for each controlled system including all controlled system elements in table format. Tables to show element name, type of device, manufacturer, model number, and product data sheet number.
 - 2) Provide a schematic diagram of each controlled system. Include control points labeled with appropriate point names. Graphically show the location of all control elements.

- 3) Provide a schematic wiring diagram for each controlled system. Label all elements. Label all terminals.
- 4) Provide a mounting, wiring, and routing plan-view drawing. Layout to account for HVAC, electrical, and other system design and layout requirements.
Provide a complete written sequence of operations for each system or subsystem under all modes of operation. Where Contractor proposes any variation to the sequence of operation described hereunder, the Contractor shall specifically highlight the change and describe the reason for the revision.
- 5) 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.

1.04 DESIGN REQUIREMENTS

- A. BACnet Compliance
 1. The BAS shall exchange data between workstations or workstations and building level controllers over the Management Level Network and First-tier BAS Controller Level Network using BACnet Protocol in the form of BACnet objects.
 2. The BAS shall perform network functions using the following BACnet services:
 - a. Alarm and Event
 - b. Scheduling
 - c. Trending
 - d. Network Management

1.05 QUALITY ASSURANCE

- A. All products required to conform to BACnet Standards must be BACnet Testing Laboratory (BTL) listed.
- B. 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.
- C. Control Contractor to have in-house, factory-trained and factory-authorized installers and programmers.

1.06 CODES AND STANDARDS

- A. Work, materials, and equipment shall comply with all local, state, and federal codes and ordinances.
- B. Each DDCP 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.

1.07 UPDATES

- A. Provide at no extra cost all software and firmware updates that become available from the manufacturer during the warranty period.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Johnson Controls

2.02 SYSTEM CONTROLLERS

- A. First-tier Controllers (Building Controllers): Independent, stand-alone, microprocessor-based controller to manage global control and communication. Provide the number of first-tier controllers needed to meet specified performance requirements. As a minimum, provide one first-tier controller per building. Controllers shall have the following general characteristics. BTL Listed.
 - 1. Sufficient memory in each controller to support its operating system, database, and programming requirements including specified spare capacity.
 - 2. Controller operating system to manage input and output communications allowing distributed controllers to share real and virtual object information and allow central monitoring and alarms.
 - 3. Controller shall continually check the status of its processor and memory circuits. If an abnormal condition is detected, the controller shall assume a pre-determined failure mode, and generate an alarm notification.
 - 4. Controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.
 - 5. Controller shall include a service communication port allowing connection to a portable operator's terminal.
- B. Advanced Application Controllers: Independent, stand-alone, microprocessor-based controller to provide local control of systems and equipment requiring advanced program sequences. Provide the number of advanced application controllers needed to meet specified performance requirements. Controllers shall have the following general characteristics. BTL Listed.
 - 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 in conditioned space mounted in dust-proof enclosures and rated for operation at 32 degrees F to 120 degrees F.
- E. Provide diagnostic LEDs for power, communication, and processor. All wiring connections made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
 - F. All controllers shall operate at 90% to 110% of nominal voltage and perform an orderly shutdown below 80% nominal voltage. Operation protected against electrical noise at 5 to 120 Hz and from keyed radios up to 5 W at 3 feet.

2.03 INPUT/OUTPUT INTERFACE

- A. Hardwire inputs and outputs may connect to the system through a first-tier, advanced application, or application specific controller.
- B. All input and output points protected so that shorting of the point to itself, to another point, or to ground will cause no damage to the controller. All input and output points protected from connected voltage up to 24V of any duration.
- C. Binary Inputs: Binary controller inputs shall provide a wetting current of at least 12 mA and shall be protected against the effects of contact bounce and noise. Binary inputs shall sense "dry contact" closure without external power application required.
- D. Pulse Accumulation Inputs: In addition to standard binary input characteristics, pulse accumulation inputs shall accept up to 10 pulses per second.
- E. Analog Inputs: Analog inputs shall allow the monitoring of low voltage (0 to 10VDC), current (4 to 20 mA), or resistance signals (thermistor or RTD). Analog inputs compatible with commonly available sensing devices.
- F. Binary Outputs: Binary outputs to provide on/off control or a pulsed low-voltage signal for pulse-width modulation. Provide three-position (on/off/auto) switch for each output along with indicator light. Output selectable for normally open or normally closed operation.
- G. Analog Outputs: Analog outputs to provide a modulating 0 to 10V or 4 to 20 mA signal for control of an end device. Provide two-position (auto/manual) switch, status lights, and manually adjustable potentiometer for each output. Analog output drift less than 0.4% of range per year.
- H. Tri-state Outputs: Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point actuators limited to terminal unit and unit ventilator control applications. Control algorithms shall send the actuator to one end of its stroke every 24 hours for verification of operator tracking.

2.04 POWER SUPPLIES AND LINE FILTERING

- A. Provide UL listed control transformers. Provide class 2 current-limiting type or furnish over-current protection in both primary and secondary circuits in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
- B. Provide transient voltage and surge suppression for all workstations and controllers either internally or as an external component. Surge suppression shall have the following minimum performance criteria:

1. Dielectric strength of 1000 volts minimum.
2. Response time of 10 nanoseconds.
3. Transverse mode noise attenuation of 65 dB or greater.
4. Common mode noise attenuation of 150 dB or better at 40 Hz to 100 Hz.

2.05 WIRING AND RACEWAYS

- A. Provide wiring, plenum cable, and raceways in accordance with Division 26.
- B. All insulated wire to have copper conductor. UL labeled for 90 degree C service.

PART 3 - EXECUTION

3.01 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 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.

3.02 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.

3.03 GENERAL WIRING

- A. All control and interlock wiring shall comply with national and electrical codes and Division 26. Where requirements of this section differ from those in Division 26, the requirements of this section shall take precedence.
- B. Provide circuits for controls power as required. Coordinate with Division 26 for provision of power.
- C. All line voltage wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.

- D. All low-voltage wiring shall meet NEC Class 1 or Class 2 requirements. Low voltage power circuits shall be sub-fused when required.
- E. Where NEC Class 1 and Class 2 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.
- F. All wiring in mechanical, electrical, or service rooms and wiring located where it may be subject to damage shall be installed in raceway.
- G. 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.
- 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 firestop foam where necessary to maintain fire rating.
- O. Provide size of raceway and size and type of wire as required by NEC and as required to meet manufacturers' recommendations for connected equipment.
- P. Include one pull string in each raceway 1-inch or larger.
- Q. Use color coded conductors throughout.
- R. Locate control and status relays in designated enclosures only. Such enclosures include packaged equipment control cabinets unless such cabinets also contain Class 1 starters.
- S. Conceal all raceways except within mechanical, electrical, or service rooms. Maintain minimum raceway clearance of 6-inches from high temperature equipment such as steam piping or boiler flues.
- T. Secure raceways with raceway clamps fastened to the structure and spaced in accordance with code requirements. Raceways and pull boxes may not be hung on flexible duct strap

or tie rods. Raceways may not be supported from ductwork, electrical raceways, piping, or suspended ceiling systems.

- U. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of all raceways.
- V. Maintain updated wiring diagrams (as built) at site with terminations identified.
- W. Flexible metal raceways and liquid-tight, flexible metal raceways shall not exceed 3-feet in length and shall be supported at both ends. Flexible metal raceway less than ½-inch electrical trade size shall not be used. In areas exposed to moisture, including but not limited to chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.

3.04 COMMUNICATION WIRING

- A. Install in accordance with 3.03 above.
- B. Follow manufacturers' recommendations for all communications cabling including but not limited to maximum pulling, tension, and bend radius.
- C. Do not install communications cabling in a raceway or enclosure containing Class 1 or other Class 2 wiring.
- D. Verify the integrity of the entire network immediately following cable installation using test measures appropriate for each cable.
- E. Provide a lightning arrestor between cables and grounds where cable enters or exits a building. Install arrestor in accordance with manufacturers' recommendations.
- F. All communications wiring shall be un-spliced length when that length is commercially available.
- G. All communications wiring shall be labeled to indicate origination and destination.
- H. Ground coaxial cable in accordance with NEC regulations article on "Communications Circuits, Cable and Protector Grounding."

3.05 IDENTIFICATION OF HARDWARE AND WIRING

- A. Label all wiring and cabling, including wiring and cabling terminating within factory-fabricated panels, within 2 inches of termination with the BAS address or termination number.
- B. Permanently label or code each point of field terminal strips to show the instrument or item served.
- C. Identify control panels with minimum ½-inch letters on laminated plastic nameplate.
- D. Identify all other control components with permanent labels. All plug-in components shall be labeled so that removal of component does not remove label.
- E. Identify room sensors relating to terminal box or valves with nameplate located within sensor cover.

- F. Arrange components so that UL or CSA labels are visible after equipment is installed.
- G. Identifiers shall match record documents.
- H. Provide laminated network communication diagrams, point-to-point wiring diagrams, and process control diagrams in each control panel for control components contained therein.

3.06 BAS CONTROLLER INSTALLATION

- A. Provide a separate BAS controller for each 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 Advanced Application Controllers shall be selected to provide a minimum of 15% spare I/O point capacity for each point type. If input points are not universal, 15% of each type is required. A minimum of one spare is required for each type of point used.
 - 1. Future use of spare capacity shall require providing the field device, field wiring, point database definition, and custom software. No additional controller boards or point modules shall be required to implement use of spare points.
- C. Provide sufficient internal memory for the specified sequences of operation and trend logging. Provide a minimum of 25% available memory free for future use.

3.07 PROGRAMMING

- A. Provide programming for the system as required to perform the sequence of operation. See Section 23 09 29 – BAS Sequence of Operations for HVAC. Provide all other programming necessary for proper operation of the system but not specified including but not limited to time delays, control deadbands, equipment interlocks, equipment sequencing, alarm notification, and control sequences recommended by equipment manufacturers.
- B. All control setpoints and loop tuning parameters accessible for review and adjustment at workstation graphics or through workstation menus without requiring modification of program code.
- C. For systems using text-based programming, imbed comments in the programming code to clearly describe each section of the program.
- D. Contractor to provide time scheduling functions as specified in the Sequence of Operations. Independent schedules shall be provided for each system, unless otherwise specified.
- E. Contractor to provide alarming functions as specified in the 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 functions as directed by Owner including trend data collection and report format.
- G. Point Naming: System point names shall be modular in design, allowing easy operator interface without the use of a written point index. Point naming convention as follows.

1. AA.BBB.CCDDE where
 - a. AA designates the location of the point within the building, such as a mechanical room, wing, level, or the building itself in a multi-building environment.
 - b. BBB designates the system which the point is associated. (e.g., A01 for air handler 1, HTG for heating water system, etc.)
 - c. CC designates the equipment or material referenced within the system. (e.g., SF for supply fan, HR for heating water return, etc.)
 - d. D or DD used for clarification or for identification if more than one CC exists.
 - e. E designates the action or state of the equipment or medium. (e.g., T for temperature, H for humidity, C for control, S for status, D for damper control, etc.)

- H. Configure three usernames with differing levels of privileges. Meet with Owner's Authorized Representative and coordinate access levels and privileges for each uses access.

3.08 GRAPHICS

- A. Provide graphics for all controlled systems and floor plans of the building. As a minimum, systems requiring graphics to include each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. On each graphic, show input and output points for the system. Also, show relevant calculated points such as setpoints. Input, output, and software point values shall be changeable from graphic screen. Provide link to a text file containing the automatic control sequence of operations.
- B. Meet with Owners Authorized Representative prior to beginning development of graphic displays to discuss Owner's preferences.
- C. Show terminal unit information on a "graphic" summary table. Provide dynamic information on each point shown.

3.09 CONTROL SYSTEM CHECKOUT AND TESTING

- A. Contractor shall completely test and verify specified control system performance. Compile test results and include with written certification.
- B. Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service all instruments, controls, and accessory equipment furnished hereunder.
- C. Contractor shall perform the following testing and verification
 1. Verify that all control and communications wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
 2. 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.
 3. Verify control stability and end-to-end reporting requirements are met.
 4. 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.
 5. 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.
 6. Verify that system operation complies with the sequence of operations. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all BAS control loops and optimum start/stop routines.

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.
- D. 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 setpoint 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 setpoint, 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 setpoints, 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.

END OF SECTION

SECTION 23 09 29

BAS SEQUENCE OF OPERATIONS FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide custom engineered BAS operating software to perform control sequences specified.
 - 1. 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.
 - 2. The control system shall include of all necessary devices and software to provide the sequences of operation described herein.

1.02 DEFINITIONS

- A. BAS: Building Automation System.
- B. EC: Electrical Contractor.

1.03 SUBMITTALS

- A. Provide Action Submittals, Informational Submittals, and Close-out Submittals. Refer to 23 09 23 - Building Automation Systems for HVAC.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Control Programming
 - 1. Control setpoints and parameters listed in control sequences are initial values. Adjust setpoints and control parameters as required to achieved desired environment conditions, optimum system performance, and as recommended by the TAB contractor and/or Commissioning Agent.
 - 2. Control parameters and setpoints listed in the sequence of operations shall be adjustable from the Operator Workstation without modification of control programming or use of proprietary software. All setpoints which are necessary for normal operation and optimization of system performance shall be adjustable, and shall include, but not be limited to: time schedules; temperature, pressure, humidity, and CO2 setpoints; time delay settings; safety sequence setpoints; and alarming parameters.
- B. BAS Points List
 - 1. Provide all control points required to perform the automatic control sequence described herein, which as a minimum shall include all points listed in BAS Points List scheduled on mechanical and plumbing drawings.
 - 2. Point Communication: All points listed are to be hardwired to BAS controllers, except where point is identified as being communicated over a BAS network.

- a. PTP = Hardwired point-to-point
- b. C = BAS network communication
- 3. Point Source: All points shall be connected to field-mounted control devices, except where the point is identified as being obtained from an equipment controller identified. See Drawing Legend or equipment schedules for designation of equipment control panel abbreviations.

C. Monitoring and Alarms

- 1. Provide BAS alarm functions and configuration as detailed in plans and specifications, and as directed by Owner's Authorized Representative. Alarm functions may include:
 - a. Visual display on workstation graphic.
 - b. Audible alarm at workstation computer.
 - c. Listing in workstation alarm log.
 - d. "Pop-up" alarm notification at workstation computer.
 - e. Dial-out alarm to Owner's security staff or alarm monitoring service.
 - f. Email and/or text message.

D. Control Network Integration

- 1. Where BAS network communications are integrated with networkable control equipment controllers or compatible control systems, Contractor shall configure accessible points for control, monitoring, and alarm as required to provide specified sequences and as directed by the Owner's Authorized Representative for trending and monitoring.

2.02 BURIED PIPE LEAK DETECTION

- A. General: Monitor buried pipe leak detection monitor module. In event that piping system detects leak initiate alarm. Maintain alarm until acknowledged by operator.
- B. Provide graphic display screen listing the following BAS Input/Output Points List:
 - 1. Provide all control points required to perform the automatic control sequence described above, which as a minimum shall include all points listed below:

BAS Points List	Equipment Connection
Digital Inputs	
Leakage Alarm	Piping system leak detection module

2.03 SEWAGE EJECTOR PUMP (SE-1)

- A. General: Replacement of existing sewage ejector duplex lift station.
- B. Sewage Ejector Level Control: Pumps controlled by packaged control system to maintain receiver basin level.
- C. Safety Control:
 - 1. High Water Alarm: Initiate an alarm if the high-water level switch is activated. Maintain alarm until acknowledged by operator.
 - 2. Power Failure: Initiate an alarm if electrical power interruption to the sewage ejector occurs. Maintain alarm until acknowledged by operator.
- D. Provide graphic display screen listing the following BAS Input/Output Points List:

1. Provide all control points required to perform the automatic control sequence described above, which as a minimum shall include all points listed below:

BAS Points List	Equipment Connection
Digital Inputs	
High Water Alarm	SE-1 Control Panel
Power Supply to SE-1	

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install complete control system including all components, devices, and accessories required to perform specification sequence of operation and provide intended system performance.

END OF SECTION

SECTION 23 21 10

UNDERGROUND HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Pre-engineered conduit piping.

1.02 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Pre-engineered conduit piping system components.
- B. Shop Drawings: For underground steam and condensate piping. Signed and sealed by a professional engineer.
 - 1. Submitted detailed design layout drawings including pipe sizes, locations, elevations showing all anchors and guides. Layout drawings shall also include all analysis node points.
 - 2. Show details and sections of piping in trench, conduit, and cased pipe with clearances between piping, and show insulation thickness.
 - 3. Calculate requirements for expansion compensation for underground piping. Calculate pipe stress and system expansion for each expansion compensation elbow using a finite element computer generated three-dimensional analysis. Calculations, including heat loss calculations, shall demonstrate that pipe stresses from temperature changes are within the allowable requirements in ASME B31.1 and the anchors and the guides will withstand the resultant forces. The computer analysis results shall include node stresses, forces, moments and displacements.
 - 4. Show expansion compensators, offsets, and loops with appropriate materials to allow piping movement in the required locations. Show anchors and guides that restrain piping movement with calculated loads and show concrete thrust block dimensions.
 - 5. Coordinate required anchor locations as determined in design with those shown on construction documents.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualifications Date: For qualified installer
- B. Welding certificates.
- C. Material Test Reports.
- D. Field quality control reports.
- E. Survey report of installed piping slope.

1.04 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.
 - 1. Comply with provisions in ASME B31.9, "Building Services Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
- C. Manufacturer installer certifications where required for product warranty.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings:
 1. High Pressure Steam Piping: 125 psig at 365°F.
 2. Pumped Condensate Piping: 100 psig at 250°F.

2.02 STEEL PIPES AND FITTINGS

- A. Steel Pipe: Steel Pipe: ASTM A 53/A 53M, black with plain ends; type, grade, and wall thickness as indicated in "Piping Application" Article.
- B. Cast-Iron, Threaded Fittings: ASME B16.4; Class 125.
- C. Malleable-Iron, Threaded Fittings: ASME B16.3, Class 150
- D. Malleable-Iron Unions: ASME B16.39; Class 150.
- E. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
 1. Material Group: 1:1.
 2. End Connections: Butt welding.
 3. Facings: Raised face.
- F. Steel Welding Fittings: ASME B16.9, seamless or welded.
 1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.
- H. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and -bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
- I. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

2.03 PRE-ENGINEERED CONDUIT PIPING SYSTEM

- A. Description: Factory-fabricated and -assembled, airtight and watertight, drainable, pressure-tested piping with conduit, inner pipe supports, and insulated carrier piping. Fabricate so insulation can be dried in place by forcing dry air through conduit.

1. Manufacturers: Subject to compliance with requirements, provide one of the following products:
 - a. Perma Pipe, Inc. ESCON A Ferro Shield
 - b. Thermacor Duo-Therm 505
- B. Carrier Pipe: Schedule 40 steel pipe and fittings, STM A-53, Grade B, ERW. Schedule 80 steel where indicated in "Piping Application" Article.
- C. Carrier Pipe Insulation:
 1. Polyurethane Foam Pipe Insulation: Unfaced, preformed, rigid cellular polyurethane material intended for use as thermal insulation.
 - a. Minimum thickness of 1"
 - b. Insulation shall be rigid, 90% closed cell polyurethane with a minimum 2.4 lbs. per cubic foot density, and a compressive strength of 30 psi @ 75°F.
 - c. Comply with ASTM C591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed 0.16 Btu x in./h x sq. ft. x deg F at 75 deg F after 180 days of aging.
 - d. Fabricate shapes in accordance with ASTM C450 and ASTM C585.
 - e. The insulation shall have a bare copper wire embedded into the system between the steel casing and the HDPE jacket. The wire shall be monitored by an alarm panel which measures resistance between the carrier pipe and the steel casing. The panel shall be capable of alarming in the event of low resistance.
- D. Conduit: 10-gauge, welded, smooth-wall black steel conforming to ASTM A-211, A-139, A-134, and A-135 spiral wound steel.
 1. Cover: With polyurethane foam insulation with an HDPE jacket.
 2. Piping Supports within Conduit: Corrugated galvanized steel with a maximum spacing if 10 feet.
 3. Fittings: Factory-fabricated and -insulated elbows and tees. Elbows may be bent pipe equal to carrier pipe. Tees shall be factory fabricated and insulated and shall be compatible with the carrier pipe.
 4. Expansion Offsets and Loops: Size casing to contain piping expansion.
 5. Accessories include the following:
 - a. Guides and Anchors: Steel plate welded to carrier pipes and to casing, complete with vent and drainage openings inside casing.
 - b. End Seals: Steel plate welded to carrier pipes and to casing, complete with drain and vent openings on vertical centerline.
 - c. Gland Seals: Packed stuffing box and gland follower mounted on steel plate, welded to end of casing, permitting axial movement of carrier piping, with drain and vent connections on vertical centerline.
 - d. Pressure Testable Joint Closure: On straight run joints.
 - e. Conduit fittings: Factory pre-fabricated, pre-insulated, and jacketed with a molded, extrusion welded, or butt fusion welded PE jacket.
- E. Jacket:
 1. High density polyethylene (HDPE): Extruded, black, having a minimum wall thickness of 200 mils.
 - a. The inner surface of the HPDE jacket shall be oxidized by means of corona treatment of flame treatment to ensure a secure bond between the jacket and foam insulation preventing any ingress of water at the jacket/foam interface.
- F. Leak Detection Panel:
 1. Alarm panel monitoring copper wire which measures resistance between the carrier pipe and the steel casing. The panel shall be capable of alarming in the event of low resistance and reporting out to Building Automation System.

- G. Source Quality Control: Factory test conduit and carrier pipe as indicated in Part 3.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. See Division 31 for excavation, trenching, and backfilling.
- B. Underground systems shall be buried in a trench not less than two feet deeper than the top of the pipe and not less than eighteen inches wider than the combined O.D. of all piping systems. A minimum thickness of 24 inches of compacted backfill placed over the top of the pipe will meet H-20 highway loading.
- C. Trench bottom shall have a minimum of 6 inches of sand, pea gravel, or specified backfill as a cushion for the piping. All field cutting of the pipe shall be performed in accordance with the manufacturer's installation instructions.

3.02 PIPING APPLICATION

- A. High Pressure Steam Piping:
 - 1. 2-1/2-inch and larger shall be one of the following:
 - a. Schedule 40 steel carrier pipe in a pre-engineered conduit piping system.
- B. Pumped Condensate Piping:
 - 1. 2-1/2-inch and larger shall be one of the following:
 - a. Schedule 80 steel carrier pipe in a pre-engineered conduit piping system.

3.03 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Remove standing water in the bottom of trench.
- C. Do not backfill piping trench until field quality control testing, pipe slope survey, and Manufacturer's Field Service have been completed and results approved.
- D. Install piping with slope as indicated in Civil plans.
- E. In conduits, install drain valves at low points and manual air vents at high points.
- F. Install components with pressure rating equal to, or greater than, system operating pressure.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. See Section 23 05 17 – Sleeves and Sleeve Seals for HVAC Piping, for sleeves and mechanical sleeve seals through exterior building walls.

- J. Secure anchors and fittings where piping changes direction, and where elsewhere required by manufacturer's written installation instructions, with concrete thrust blocks. Apply bitumastic coating to carbon-steel anchors and guides. Pour concrete thrust blocks and anchors.

3.04 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
- D. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants in bolt threads.
- E. Conduit and Cased Piping Joints: Assemble sections and finish joints with pourable or split insulation and exterior jacket sleeve and apply shrink-wrap seals.

3.05 IDENTIFICATION

- A. Install continuous plastic underground warning tapes during back filling of trenches for underground steam and condensate piping. Locate tapes 6 to 8 inches below finished grade, directly over piping. See Division 31 for warning tape materials and devices and their installation.

3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Arrange for Manufacturer representatives to perform site visits at the following milestones:
 - 1. At time of material delivery.
 - 2. Prior to joint closure installation for installed piping inspection.
 - 3. After system is fully installed and in service to review alarm panel and monitoring system.
- C. Tests and Inspections:
 - 1. Prepare steam and condensate piping for testing according to ASME B31.9 and as follows
 - a. Leave joints, including welds, uninsulated and exposed for examination during test.
 - b. Fill system with water. Where there is a risk of freezing, air or a safe, compatible liquid may be used.
 - c. Use vents installed at high points to release trapped air while filling system.
 - 2. Test steam and condensate piping as follows:
 - a. Subject steam and condensate piping to hydrostatic test pressure that is not less than 1.5 times the design pressure.
 - b. After hydrostatic test pressure has been applied for 10 minutes, examine joints for leakage. Remake leaking joints using new materials and repeat hydrostatic test until no leaks exist.

3. Test conduit as follows:
 - a. Seal vents and drains and subject conduit to 15 psig for 4 hours with no loss of pressure. Repair leaks and retest as required.
 4. Engage surveyor to measure installed site steam piping slope prior to backfill/cover.
- D. Prepare test and inspection reports, including survey of installed piping slope.

END OF SECTION

SECTION 23 21 15

SNOW MELTING SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Snowmelt tubing replacement due to concrete sidewalk demolition for access to tunnel under Quinn Coliseum.

1.02 ACTION SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 23 05 00 – General HVAC Provisions. Submittal requirements indicated by column number designation as follows:
1. Materials List
 2. Catalog Data
 3. Special Requirement listed herein.

PRODUCT TABLE	1	2	3
Tubing	X	X	X
Foam Board Insulation		X	
Fittings		X	
Glycol		X	

- B. Special Requirements:
1. Pressure Testing Reports: Provide report of tubing pressure testing as indicated in Part 3.

1.03 WARRANTY

- A. Manufacturer shall warranty the tubing for twenty (20) years, and eighteen (18) months for other parts of the system from the date of Substantial Completion. If products are defective the manufacturer shall repair or replace the product as necessary to provide a complete and operational system.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Furnish and install a complete and operational snow melting system. Provide all materials as required. System shall include the system design, manifolds, isolation valves, air vents, drain ports, manifold support, pipe tie wires, & controls.

2.02 TUBING

- A. Tubing buried in Concrete Slab: ASTM F876, ASTM D3350 crosslinked polyethylene with an integral oxygen diffusion barrier to reduce the potential for system corrosion. Tubing shall be 3/4". Tubing shall be rated for a pressure of 100 psi at 180°F. Tubing shall have an oxygen diffusion barrier capable of limiting oxygen diffusion through the tube to no

greater than 0.10 g/m3/day @ 104°F water temperature. The minimum bend radius for cold bending of the tube shall not be less than six (6) times the outside diameter. Bends with a radius less than stated shall require the use of a bend support as supplied by the tubing manufacturer. Wirsbo hePEX manufactured by Uponor or approved.

- B. Tubing not in Concrete Slab:
 - 1. General: Prefabricated piping system consisting of carrier pipe, insulation, and outer jacket.
 - 2. Carrier Piping: ASTM F876, ASTM D3350 cross-linked polyethylene, continuous length, no couplings, or ASTM D3035 high density polyethylene piping with heat fusion welded joints.
 - 3. Insulation: Spray applied, two pound per cubic foot density, polyurethane foam, two-inch thickness. Closed cell content - 90-95 % in accordance with MIL-I-24172 and ASTM C-591. Completely fill annular space between carrier pipe and jacketing.
 - 4. Outer Jacket: Polyethylene.

2.03 FOAM BOARD INSULATION

- A. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
 - 1. Type: ASTM C578.
 - 2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 4. R-value; 1 inch of material at 72 degrees F: 5, minimum.
 - 5. Board Thickness: 2 inches.
 - 6. Board Edges: Square.
 - 7. Location: Below slabs with radiant heat.
 - 8. Manufacturers:
 - a. DiversiFoam Products
 - b. Dow Chemical Co
 - c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation

2.04 FITTINGS

- A. Fittings shall be manufactured of dezincification resistant brass. These fittings must be supplied by the tube manufacturer. The fittings shall consist of a barbed insert, a compression ring, and a compression nut.

2.05 GLYCOL

- A. Propylene glycol-base industrial coolant. Multi-component corrosion inhibitor system. Glycol must be thoroughly mixed in 30% glycol/70% water solution before the solution is entered into the system.
- B. Manufactured by Dow or Union Carbide.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install all snow melt system components in strict accordance with manufacturer's instructions.

- B. Provide foam board insulation under replaced sidewalk panels with radiant heat.
- C. Tubing shall be attached by tying to rebar in accordance with manufacturer's instructions. Tubing shall be installed in a reverse-return layout pattern.
- D. Hydronic snow-melt tubing loops shall be installed in accordance with the manufacturer's recommendations and the details as shown on the contract drawings.
- E. All fittings should be accessible for maintenance. Splice tubing loops to existing tubing only at the points of entry or exit to new panel.
- F. Installation shall follow the shop drawings for tubing layout, tube spacing, manifold configuration, manifold, location, and controls. All notes on the Drawings shall be followed. Loop layout to match existing tubing in panel(s) for demolition.
- G. The tubing system shall be pressurized, with water or air, in accordance with applicable codes, or to a pressure of 60 psig 24 hours prior to encasement in the radiant panel. The tubing system shall remain at this pressure during the panel installation, and for a minimum of 24 hours thereafter to ensure system integrity. The contractor shall provide the water or air for the pressurization of the tubing system. The contractor assumes all liabilities for suitable safety precautions and testing, including the use of compressed air when applicable. Use pressurized with water for applications below asphalt paved surfaces. Circulate water when paving is being performed.
- H. Prior to start-up or onset of freezing weather the contractor shall procure and install glycol to a percentage as prescribed by the designer to prevent any possibility of freezing the tubing system.

3.02 START-UP SERVICE

- A. Notify Engineer after tubing is installed, prior to concrete pour.
- B. Provide pressure testing reports.

END OF SECTION

SECTION 23 22 13

STEAM AND CONDENSATE HEATING PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes pipe and fittings for low pressure and high-pressure steam and condensate piping:
 - 1. Pipe and fittings.

1.03 DEFINITIONS

- A. HP Systems: High-pressure piping operating at more than 15 psig as required by ASME B31.1.
- B. LP Systems: Low-pressure piping operating at 15 psig or less as required by ASME B31.9.

1.04 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressures and temperatures:
 - 1. HP Steam Piping: 125 psig.
 - 2. Condensate Piping: 100 psig at 250°F.
 - 3. Air-Vent and Vacuum-Breaker Piping: Equal to pressure of the piping system to which it is attached.

1.05 ACTION SUBMITTALS

- A. Provide materials list for piping and fitting type.

1.06 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control test reports.

1.07 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For valves, safety valves, pressure-reducing valves, steam traps, air vents, vacuum breakers, and meters to include in emergency, operation, and maintenance manuals.

1.08 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code - Steel."
- B. Pipe Welding: Qualify processes and operators according to the following:
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. ASME Compliance: Comply with ASME B31.1, "Power Piping" and ASME B31.9, "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.01 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, plain ends, Type, Grade, and Schedule as indicated in Part 3 piping applications articles.
- B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125, 150, and 300 as indicated in Part 3 piping applications articles.
- C. Malleable-Iron Threaded Fittings: ASME B16.3; Classes 150 and 300 as indicated in Part 3 piping applications articles.
- D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 piping applications articles.
- E. Cast-Iron Threaded Flanges and Flanged Fittings: ASME B16.1, Classes 125 and 250 as indicated in Part 3 piping applications articles; raised ground face, and bolt holes spot faced.
- F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
- G. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1. Material Group: 1.1.
 - 2. End Connections: Butt welding.
 - 3. Facings: Raised face.
- H. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, black steel of same Type, Grade, and Schedule as pipe in which installed.

2.02 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. Spiral wound gasket designed for usage on heat exchangers.
 - a. Pressure class 300
 - b. Type 316 winding steel and inner ring steel
 - c. Graphite filler material

- d. Flexitallic HE-RIR or approved equal
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.
- E. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- F. Welding Materials: Comply with Section II, Part C, of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

PART 3 - EXECUTION

3.01 HP STEAM PIPING APPLICATIONS

- A. HP Steam Piping, NPS 2-1/2 through NPS 12: Schedule 40, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
- B. Condensate piping above grade, NPS 2 and smaller, shall be the following:
 - 1. Schedule 80, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
- C. Condensate piping above grade, NPS 2-1/2 and larger, shall be the following:
 - 1. Schedule 80, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.

3.02 VALVE APPLICATIONS

- A. Install shutoff duty valves at branch connections to steam supply mains, at steam supply connections to equipment, and at the outlet of steam traps.

3.03 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Use indicated piping locations and arrangements unless approved by Engineer.
- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.

- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Install piping to allow application of insulation.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- K. Install drains, consisting of a tee fitting, NPS 3/4 full port-ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- L. Install steam supply piping at a minimum uniform grade of 0.42 percent downward in direction of steam flow. Refer to civil drawings for pipe sloping requirements.
- M. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
- N. Install branch connections to mains using tee fittings in main pipe, with the branch connected to top of main pipe.
- O. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- P. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.
- Q. Install strainers on supply side of control valves, pressure-reducing valves, traps, and elsewhere as indicated. Install NPS 3/4 nipple and full port ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.
- R. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, and control valves.
 - 1. On straight runs with no natural drainage points, install drip legs at intervals not exceeding 300 feet.
 - 2. Size drip legs same size as main. In steam mains NPS 6 and larger, drip leg size can be reduced, but to no less than NPS 4.
- S. Install sleeves for piping penetrations of walls, ceilings, and floors.

3.04 HANGERS AND SUPPORTS

- A. Comply with requirements in Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment for installation of hangers and supports.
- B. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.05 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube ends. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.06 FIELD QUALITY CONTROL

- A. Prepare steam and condensate piping according to ASME B31.1, "Power Piping" and ASME B31.9, "Building Services Piping," and as follows:
 - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
 - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - 3. Flush system with clean water. Clean strainers.
 - 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
- B. Perform the following tests on steam and condensate piping:
 - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - 2. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
- C. Prepare written report of testing.

END OF SECTION

SECTION 23 22 16

STEAM AND CONDENSATE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the following piping specialties for steam and condensate piping:
 - 1. Strainers.
 - 2. Steam traps.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Steam trap.

1.03 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For valves and steam traps to include in emergency, operation, and maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Pipe Welding: Qualify procedures and operators according to the following:
 - 1. ASME Compliance: Steam safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressures and temperatures unless otherwise indicated:
 - 1. HP Steam Piping: 125 psig.
 - 2. Condensate Piping: 100 psig at 250 deg F.

2.02 SPECIALTY VALVES

- A. Stop-Check Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane; Crane Energy Flow Solutions.
 - b. Jenkins Valves.
 - c. Lunkenheimer Valves.
 - 2. Body and Bonnet: Malleable iron.
 - 3. End Connections: Flanged.
 - 4. Disc: Cylindrical with removable liner and machined seat.
 - 5. Stem: Brass alloy.
 - 6. Operator: Outside screw and yoke with cast-iron handwheel.
 - 7. Packing: Polytetrafluoroethylene-impregnated packing with two-piece packing gland assembly.

8. Pressure Class: 250.

2.03 STRAINERS

- A. Y-Pattern Strainers:
 1. Body: ASTM A 126, Class B cast iron, with bolted cover and bottom drain connection.
 2. End Connections: Threaded ends for strainers NPS 2 and smaller; flanged ends for strainers NPS 2-1/2 and larger.
 3. Strainer Screen: Stainless-steel.
 - a. 2-inch and below: 20-mesh strainer.
 4. Tapped blowoff plug.
 5. CWP Rating: 250-psig working steam pressure.

2.04 STEAM TRAPS

- A. Float and Thermostatic Traps:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong International, Inc.
 - b. Hoffman Specialty.
 - c. Spirax Sarco, Inc.
 - d. MEPCO, LLC.
 2. Body and Bolted Cap: ASTM A 126, cast iron.
 3. End Connections: Threaded.
 4. Float Mechanism: Replaceable, stainless steel.
 5. Head and Seat: Hardened stainless steel.
 6. Trap Type: Balanced pressure.
 7. Thermostatic Bellows: Stainless steel or monel.
 8. Thermostatic air vent capable of withstanding 45 deg F of superheat and resisting water hammer without sustaining damage.
 9. Vacuum Breaker: Thermostatic with phosphor bronze bellows, and stainless-steel cage, valve, and seat.
 10. Maximum Operating Pressure: 125 psig.
- B. Inverted Bucket Traps:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong International, Inc.
 - b. Hoffman Specialty.
 - c. Spirax Sarco, Inc.
 - d. MEPCO, LLC.
 2. Body and Cap: Cast iron.
 3. End Connections: Threaded.
 4. Head and Seat: Stainless steel.
 5. Valve Retainer, Lever, and Guide Pin Assembly: Stainless steel.
 6. Bucket: Brass or stainless steel.
 7. Strainer: Integral stainless-steel inlet strainer within the trap body.
 8. Air Vent: Stainless-steel thermostatic vent.
 9. Pressure Rating: 250 psig.

2.05 CONDENSATE RETURN FLASH ARRESTOR

- A. Factory assembled flash arrestor for introducing high pressure condensate into low pressure return piping. Includes integral sparge tube to diffuse incoming condensate from

steam trap to reduce the effects of water hammer. Similar to Watson McDaniel FA Series Flash Arrestors or approved.

2.06 BALANCING DEVICES

- A. Flow Measuring Station:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong Pumps, Inc.
 - b. Tour & Andersson; available through Victaulic Company.
 - c. Macon Balancing.
 - d. Wheatley.
 - 2. Body:
 - a. 2-inch and Smaller: Bronze construction, threaded connection.
 - b. 2-1/2 inch and Larger: Cast-iron, flanged connection.
 - 3. Disc: Bronze
 - 4. Seat: Teflon or resin.
 - 5. Pressure Gage Connections: Integral quick connection test ports located upstream and downstream of valve seat for portable differential pressure meter.
 - 6. Handle Style: Hand wheel with vernier valve position scale and hidden memory stops.
 - 7. CWP Rating: Minimum 125 psig.
 - 8. Maximum Operating Temperature: 250°F.
 - 9. Size: Line size unless device pressure drop does not conform to the following requirements then provide nearest conforming size.
 - a. Full open pressure drop shall not exceed 3 feet water column at design flow.
 - b. Minimum position (0.5 turn) pressure drop shall not be less than 3 feet water column at design flow.
 - 10. Accessories: Preformed insulation jacket, ASTM 1784.

PART 3 - EXECUTION

3.01 VALVE APPLICATIONS

- A. Install shutoff duty valves at branch connections to steam supply mains, at steam supply connections to equipment, and at the outlet of steam traps.
- B. Install steam safety valves on pressure-reducing stations and elsewhere as required by ASME Boiler and Pressure Vessel Code. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.
- C. Steam Traps:
 - 1. Steam piping drip traps: Inverted bucket.
 - a. Flow rate: 100 lbs/hour
 - b. Inlet pressure 15 psig and below: ½ psi.
 - c. Outlet pressure above 25 psig: 1 psi.

3.02 PIPING INSTALLATION

- A. Install piping to permit valve servicing.
- B. Install drains, consisting of a tee fitting, NPS 3/4 full port-ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

- C. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- D. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.
- E. Install shutoff valve immediately upstream of each dielectric fitting.
- F. Install strainers on supply side of control valves, pressure-reducing valves, traps, and elsewhere as indicated. Install NPS 3/4 nipple and full port ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2. Orient strainers horizontally to prevent condensate trapping.

3.03 STEAM-TRAP INSTALLATION

- A. Install steam traps in accessible locations as close as possible to connected equipment.
- B. Install full-port ball valve, strainer, and union upstream from trap; install union, check valve, and full-port ball valve downstream from trap unless otherwise indicated.

3.04 BALANCING DEVICES

- A. Install in piping where shown on Drawings. Install with minimum lengths of straight upstream and downstream pipe without valves or fittings in accordance with manufacturer's recommendations. Piping in straight upstream and downstream sections to be same size as balancing device connection.

END OF SECTION

SECTION 23 22 23

STEAM CONDENSATE PUMPS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes packaged, factory-assembled, steam condensate pumping units.

1.02 ACTION SUBMITTALS

- A. Provide submittals in accordance with Section 23 05 00 – General HVAC Provisions as follows.
 - 1. Product Data: For each type of product. Include certified performance curves and rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated. Indicate pump's operating point on curves. Include receiver capacity and material.
- B. Shop Drawings: For each pump.
 - 1. Show pump layout and connections.
 - 2. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
 - 3. Include diagrams for power, signal, and control wiring.

1.03 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For pumps to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.01 SINGLE-STAGE, CENTRIFUGAL PUMPS WITH FLOOR-MOUNTED RECEIVER

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong Fluid Handling.
 - 2. ITT Corporation.
 - 3. Skidmore Pump.
 - 4. Spence Engineering Company, Inc.
 - 5. Spirax Sarco, Inc.
 - 6. Sterling.
- B. Description: Factory-fabricated, packaged, electric-driven pumps; with receiver, pumps, controls, and accessories suitable for operation with steam condensate.
 - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. ASME Compliance: Fabricate and label steam condensate receivers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- C. Configuration: Simplex floor-mounted pump with receiver and float switches; rated to pump 200°F steam condensate.

- D. Receiver:
 - 1. Floor-mounted.
 - 2. Welded steel.
 - 3. Externally adjustable float switches.
 - 4. Flanges for pump mounting.
 - 5. Water-level gage and dial thermometer.
 - 6. Pressure gage at pump discharge.
 - 7. Bronze fitting isolation valve between pump and receiver.
 - 8. Lifting eyebolts.
 - 9. Inlet vent and an overflow.
 - 10. Cast-iron inlet strainer with vertical self-cleaning bronze screen and large dirt pocket.
- E. Pumps:
 - 1. Centrifugal, close coupled, vertical design.
 - 2. Permanently aligned.
 - 3. Bronze fitted.
 - 4. Replaceable bronze case ring.
 - 5. Mechanical seals rated at 250°F.
 - 6. Mounted on receiver flange.
- F. Motor:
 - 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 23 05 13 "Common Motor Requirements for HVAC Equipment."
 - 2. Enclosure: Totally enclosed, fan cooled.
 - 3. Motor Bearings: Permanently lubricated to motors less than 5 hp, grease-lubricated ball bearings for motors 5 hp and above.
- G. Control Panel:
 - 1. Factory wired between pumps and float switches, for single external electrical connection.
 - 2. Provide fused, control-power transformer if voltage exceeds 230 V ac.
 - 3. NEMA 250, Type 1 enclosure with hinged door and grounding lug, mounted on pump.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.
- B. Support pumps and piping separately so piping is not supported by pumps.

- C. Install thermometers and pressure gages.
- D. Equipment Mounting:
 - 1. Install pumps on cast-in-place concrete equipment base(s) as specified and as detailed on drawings.

3.03 CONNECTIONS

- A. Where installing piping adjacent to machine, allow space for service and maintenance.
- B. Install a gate valve, strainer, and union at inlet to receiver tank. Install union, plug valve, pressure gage, check valve, and gate valve at pump outlet.
- C. Pipe drain to nearest floor drain for overflow and drain piping connections.
- D. Install full-size vent piping to outdoors, terminating in 180-degree elbow at point above highest steam system connection or as indicated.

3.04 STARTUP SERVICE

- A. Perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Clean strainers.
 - 3. Set steam condensate pump controls.
 - 4. Set pump controls for automatic start, stop, and alarm operation.
 - 5. Perform the following preventive maintenance operations and checks before starting:
 - a. Set float switches to operate at proper levels.
 - b. Set throttling valves on pump discharge for specified flow.
 - c. Check motors for proper rotation.
 - d. Test pump controls and demonstrate compliance with requirements.
 - e. Replace damaged or malfunctioning pump controls and equipment.
 - f. Verify that pump controls are correct for required application.
 - 6. Start steam condensate pumps according to manufacturer's written startup instructions.

3.05 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain steam condensate pumps.

END OF SECTION

SECTION 26 05 00

GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

- A. General electrical provisions apply to all work performed in Division 26.
- 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. 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 and Owner's Authorized Representative prior to fabrication.
- E. Make minor changes in equipment connections and equipment locations as directed or required before rough-in without extra cost.
- F. Use of the word "Provide" shall be equivalent to "Furnish and Install."
- G. For products specified by listing one or more manufacturers, followed by "Similar to" and one manufacture's model number, the following requirements apply:
 - 1. Approval of each listed manufacturer is contingent upon that manufacturer having a product which meets the specification, fits in the available space, and is comparable to the listed model.
 - 2. Electrical and space requirements indicated on drawings are based on the listed model and may not be suitable for all manufacturers listed. Provide revisions required to accommodate the model actually furnished.
- H. For products specified by listing one or more manufacturers, followed by a model number for each manufacturer, the following requirements apply:
- I. Provide one of the listed model numbers or an approved substitution.
- J. Electrical and space requirements indicated on the Drawings are based on one of the listed models, and may not be suitable for all models listed. Provide revisions required to accommodate the model actually furnished.

1.02 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): The governmental agency or sub-agency which regulates the construction process.
- B. Owner's Authorized Representative (OAR): Owner's representative with authority to act on Owner's behalf.
- C. Provide: Equivalent to "Furnish and Install."

1.03 COORDINATION

- A. Reference 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 commencing work.
- B. Coordinate identification systems with other trades. All electrical systems shall use identical wiring, conduit, and equipment identification and regulatory signage.

1.04 SUBMITTALS AND SHOP DRAWINGS

- A. See Section 01 33 00 – SD, PD, SUB for submittal procedures.
- B. Action Submittal Content
 1. Action submittal information not expressly required by the specifications will not be reviewed.
 2. Action submittal information shall be provided in sufficient detail to establish conformance with specified requirements. Where submitted literature includes multiple models, features, or options, the specific models, features, or options proposed shall be clearly indicated. Where a brief inspection shows that product data is not complete, the submittal will be rejected without review.
 3. Action submittal data shall be clear, concise, legible, and relevant. Where data is not properly organized and contains significant information that is not relevant, the submittal will be rejected without review.
 4. Action submittal requirements are listed in individual specification sections. The following definitions apply.
 - a. Materials List: Provide tabular list of materials including specification reference, specification product name, manufacturer, model/part number, and size and/or quantity where appropriate. Do not include supplemental data, except where specifically requested.
 - b. Catalog data: Manufacturer's standard product cut sheet.
 - c. Product Data: Detailed data including dimensions, weight, materials of construction, connections, and all other information needed to confirm that the product conforms to all requirements listed in the individual specification section.
 - d. Performance Data: Capacity, input, output, flow, etc. as required to confirm that the product meets the performance requirements scheduled in the Specifications or on the Drawings.
 - e. Wiring Diagrams: Power and control wiring diagrams.
 - f. Shop Drawings: Construction drawings of items manufactured specifically for this project including dimensions, construction details, weights, and additional information to identify the physical features of the system or piece of equipment.
 - g. Installation Instructions
 - h. Special Requirements Listed: Additional requirements indicated in individual specification sections.

1.05 QUALITY ASSURANCE

- A. All materials and equipment provided hereunder shall be installed and started in complete conformance with the manufacturer's recommendations.
- B. Asbestos products or equipment or materials containing asbestos shall not be used.

- C. Certify that each welder has passed the American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.

1.06 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.
- B. Materials and equipment provided hereunder shall be rated for the service conditions of the system to which they are connected including but not limited to temperature, pressure, and humidity.

1.07 CODES AND 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. Maintain existing systems operational. Owner will be responsible to operate and maintain existing equipment during the course of the project. However, any damage to existing equipment resulting directly from work under this Contract shall be repaired by the Contractor at no expense to Owner.

1.09 OPERATIONS AND MAINTENANCE MANUALS

- A. Comply with section 01 78 00 – O & M Data.
- B. Prepare a digital file in Portable Document Format (PDF), clearly indexed with bookmarks 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 bookmarks shall match submittal schedule and include any additional information required for operations and maintenance, whether in submitted schedule or not.
- C. 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.
- D. Provide copy of approved submittal for each product included in manual
- E. Provide printed copy and electronic configuration files for all packaged equipment control systems furnished with equipment.
- F. 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.
- G. 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.

- H. Manual Content: Manuals shall contain complete information for each item of mechanical electrical or other operating equipment. Include as applicable:
 - 1. Manufacturer's instructions for installation, startup, operation, inspection, and maintenance
 - 2. Performance capacity
 - 3. Catalog data sheets
 - 4. Parts list
 - 5. Maintenance schedules

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 stub outs and underground lines. Dimension all concealed piping from column grids or building lines. Concealed raceways, that contain feeder cables, communication conduits that are 1.5-inch diameter or greater shall be dimensioned from column grids or building lines. Alternately, provide electronically using PDF markup of contract drawings.

1.11 DEMONSTRATION

- A. General: After installation is complete, demonstrate to Engineer and Owner's Authorized Representative satisfaction as being complete and operational and entirely in conformance with Contract Documents.
- B. Preparation: Prior to demonstration, submit check-off list indicating completeness of submittals and certificates of compliance for review to Owner's Authorized Representative. Operate completed system for one week. 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. Contractor shall furnish training by equipment manufacturers in addition to training described in this section where specifically listed in other sections. Contractor shall schedule training with Owner's Project Manager minimum 48-hours prior to training session. Equipment shall be fully operational prior to scheduling training session. Manufacturer's field start-up, adjustment, and service will not fulfill manufacturer's training requirement.

1.13 WARRANTY

- A. Warrant all Work included in the Specification for a period of one year from the date of substantial completion, under provisions of Division 1.
- B. During warranty period, remedy without delay or expense to Owner any defects providing, in judgement of Engineer, that such defects are not a result of misuse or abuse on part of Owner.
- C. Warrant that all equipment and installations are in compliance with OSHA regulations.

PART 2 - PRODUCTS

2.01 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 equipment and materials shall be of one manufacturer.
- B. Equipment used as the basis of design is scheduled on Drawings or designated in product specifications. If Contractor chooses to use equipment that is not the basis of design, Contractor is responsible for all re-design and construction costs associated with variations in arrangement, dimension, or capacity. Such work may include, but is not limited to, changes to facility structure or dimensions and revisions to associated mechanical and electrical systems needed to provide equal system performance and maintainability.

2.02 ELECTRICAL EQUIPMENT

- A. Electrical Disconnect Switch: Electrical disconnect switches specified for mechanical equipment shall conform to OSHA Lock-out/Tag-out requirements.
- B. All electrical equipment shall be listed as approved for its application by the Underwriters Laboratory or other testing agency approved by the State of Oregon Electrical and Elevator Board. Approval indicates agency meets testing standard requirements for electrical safety required by Oregon Revised Statutes 479.510 through 479.855 and Oregon Administrative Rules.
- C. Enclosure: Provide the following electrical equipment enclosure types.
 - 1. NEMA 1: Dry, enclosed locations where the ambient temperature will not be outside of the equipment temperature ratings.
 - 2. NEMA 12: Enclosed mechanical spaces equipped with floor drains where dripping or splashing may occur and where the ambient temperature will not be outside of the equipment temperature ratings.
 - 3. NEMA 3R: Outdoors or in spaces where sustained water spray is possible.
 - 4. NEMA 3R: with Temperature Control: Outdoors or in unconditioned spaces where ambient temperatures will be outside of the equipment temperature ratings.
 - 5. NEMA 4X: Outdoors or in spaces that are corrosive environments.

2.03 EQUIPMENT CONNECTIONS

- A. Provide a complete electrical connection for all items of equipment including incidental wiring, materials, devices and labor necessary for a complete operating system. The location and method for connection to each item of equipment shall be verified prior to rough-in. The voltage and phase of each item of equipment shall be checked prior to connecting. Motor rotations shall be made in the proper direction. Pump motors are not to be test run until liquid is in the system and proper lubrication to all bearings in unit is checked.
- B. Conduit, wire and circuit breaker sizes for mechanical and similar equipment are based on the equipment ratings of one manufacturer. The equipment actually furnished may have different electrical characteristics. Conduit, wire, and circuit breakers shall not be ordered or installed until exact electrical requirements are obtained. The Contractor is responsible for this coordination.

2.04 FIRESTOPPING

- A. Acceptable Manufacturers: 3M, Hilti, Tremco, Nelson Firestop Products.
- B. Provide firestopping for the following:
 - 1. All penetrations through fire resistance rated floors, walls and partitions including openings containing pipes, ducts and other penetrating items.
 - 2. All penetrations through non-fire resistance rated floors where the vertical service riser penetrates three or more floors.
- C. Firestop system shall be UL Classified for the application and correspond to those indicated by reference to designation listed by UL Fire Resistance Directory.
- D. Material shall be tested in accordance to UL-1479, ASTM E-814 for the specific fire-rated construction conditions confirming to construction assembly type, penetration item type, annular space requirements, and fire-rating involved.

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 junction & pull boxes, relays & power packs, and all other electrical equipment requiring access for removal or maintenance. Type, size and exact location of access doors shall be coordinated with Engineer 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.
- E. Provide access doors as required for access to electrical equipment. Doors required for access are not necessarily shown on Drawings. Consult with Engineer for direction on placement of required doors not shown on Drawings.
 - 1. Comply with manufacturer's instructions for installation of access doors. Provide all necessary support and supplemental framing for assembly where the access doors are required. Set accurately in position, plumb, level, and flush to adjacent finish surfaces; and secure to support.

3.02 ARRANGEMENT AND INSTALLATION OF ELECTRICAL EQUIPMENT AND CONDUIT

- A. Coordinate location of conduit, sleeves, inserts, hangers, cable trays and equipment. Locate conduit, sleeves, inserts, hangers, cable tray and equipment clear of windows, doors, openings, lights, ducts, piping, and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.

- B. Equipment and Conduit Support: Coordinate structural systems necessary for conduit and equipment support with pipe and equipment locations to permit proper installation.
- C. Location of conduit sleeves, trenches and chases shall be accurately coordinated with equipment and conduit locations.
- D. Minor Conduit: Small diameter conduit runs from receptacles, lighting, equipment, and similar minor services are generally not shown but must be provided. Contractor is responsible to provide all such minor conduit where needed to maintain electrical spaces clean and neat and to allow full equipment function and maintenance.
- E. Work in Existing Building: Cut required openings through existing masonry and reinforced concrete using diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the Owner's Authorized Representative. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the 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.
- F. Inaccessible Equipment
 1. Where the Owner's Authorized Representative determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.
 2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3.03 RIGGING

- A. Design is based on use of available structure without modification except as specifically shown. Existing openings in building structures are planned to accommodate design scheme.
- B. Alternative methods of equipment delivery may be offered by Contractor and will be considered by Engineer under specified restrictions of phasing and maintenance of service as well as structural integrity of the building.
- C. Close all openings in the building when not required for rigging operations to maintain proper environment in the facility for Owner's operation and maintenance.
- D. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility. Where it is not clear that the building structure has adequate capacity to support rigging, Contractor shall check all clearances, weight limitations and shall offer a rigging plan designed by a Registered Professional Engineer. All modifications to existing building structure, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.
- E. Restore building to original condition upon completion of rigging work.

3.04 EXISTING EQUIPMENT REUSED OR RELOCATED

- A. All equipment designated as existing or furnished by Owner shall be cleaned and repaired before reinstallation. Any items requiring repair shall be brought to the attention of the construction manager before the item is reinstalled. Damage not brought to the attention of the construction manager shall be deemed the result of reinstallation of the item and shall be repaired without expense to the Owner.

3.05 ELECTRICAL SYSTEMS FIRESTOPPING

- A. Do not cover firestop installations until they are examined by the Authority Having Jurisdiction, if required.
- B. Install firestopping in accordance with manufacturer's recommendations and conditions of product UL listing.

3.06 CLEANING SYSTEMS

- A. General: After all equipment, conduits and cable tray are installed, system shall be thoroughly cleaned. Remove all nonessential stickers and labels from equipment or fixtures. Clean all light fixture lenses. Clean interior of conduit systems prior to installation of wiring.
- B. Repair or replace any discolorations or damage to systems, building finish, or furnishings resulting from Contractor's failure to properly clean system.

3.07 START UP

- A. The Electrical Contractor shall be responsible for proper operation of all systems and shall coordinate startup procedures, calibration and system checkout. System operational problems shall be diagnosed and corrected as required for system operation prior to Substantial Completion inspection.
- B. Start equipment in accordance with manufacturer's recommendations and under manufacturer's supervision where required. Ensure that associated breakers, relays, electrical overloads, and other devices intended to protect the equipment are installed and functional prior to startup.

3.08 EXTRA STOCK

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

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. Maintain electrical continuity of all existing systems. Remove or relocate electrical boxes, conduit, wiring, equipment, fixtures, etc. as may be encountered in removed or remodeled areas in the existing construction affected by this work. Wiring which serves usable existing outlets shall be removed and restored clear of the construction or demolition. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, new conduit

and wire shall be provided to bypass the abandoned outlets. If existing conduits pass through partitions or ceiling which are being removed or remodeled, new conduit and wire shall be provided to reroute clear of the construction or demolition and maintain service to the existing load.

- D. Extend circuiting and devices in all existing walls to be furred out.
- E. Existing electrical outlets and light fixtures are denoted by dotted or dashed lines. Verify exact location of existing electrical outlets and light fixtures in the field. Only partial existing electrical shown. Locations of items shown on the Drawings as existing are partially based on as built and other drawings which may contain errors. The contractor shall verify the accuracy of the information shown prior to bidding and provide such labor and material as is necessary to accomplish the intent of the contract documents.
- F. Remove all abandoned wiring to leave site clean.
- G. Keep outages to occupied areas to a minimum and prearrange all outages with the Owner's representative. Requests for outages shall state the specific dates and hours and the maximum durations, with the outages kept to these specific dates and hours and the maximum durations. This Contractor will be liable for any damages resulting from unscheduled outages or for those not confined to the preapproved times. Outages shall take place at times when the facility is not in operation or occupied by non-essential personnel. Include all costs for overtime labor as necessary to maintain electrical services in the initial bid proposal. Temporary wiring and facilities, if used, shall be removed and the site left clean before final acceptance. Requests for outages must be submitted at least (5) days prior to intended shutdown time.
- H. No circuit breaker or disconnects shall be turned off without prior approval from Owner. Coordinate with the Owner's representative responsible for the area or equipment affected for any electrical interruptions which affect the operation of the remaining portions of the facility.
- I. Verify with the General Contractor a location for storage of materials, supplies, tools, rubbish, etc. prior to start of work.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Copper building wire rated 600 V or less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.03 DEFINITIONS

- A. RoHS: Restriction of Hazardous Substances.
- B. VFD: Variable-frequency drive.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.01 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. American Bare Conductor.
 - 2. Cerro Wire LLC.
 - 3. General Cable Technologies Corporation.

- 4. Okonite Company (The).
 - 5. Southwire Company.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. RoHS compliant.
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
 - 1. Type THHN and Type THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.
- F. Ninety-eight percent conductivity, minimum.
- G. Branch Circuit Wiring: Conductors smaller than No. 12 AWG for power system branch circuits not permitted.
- H. Motor control wires shall be No. 14 minimum.

2.02 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. 3M Electrical Products.
 - 2. AFC Cable Systems.
 - 3. Gardner Bender.
 - 4. Ideal Industries, Inc.
 - 5. Burndy
 - 6. Thomas & Betts Corporation.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper.
 - 2. Type: Two hole with standard barrels.
 - 3. Termination: Compression.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Stranded conductors only.

- B. Branch Circuits: Copper. Stranded conductors only.
- C. VFD Output Circuits Cable: Shall utilize stranded, type XHHW-2 conductors.
- D. Power-Limited Fire Alarm and Control: Solid for No. 14 AWG and smaller.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- B. Feeders Concealed in Concrete, below Slabs-on Grade, and Underground: Type XHHW-2, single conductors in raceway.
- C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- D. VFD Output Circuits: Type XHHW-2 in metal conduit.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Use no wire smaller than No. 12 AWG for power and lighting circuits and no smaller than No. 16 AWG for control wiring.
- C. Use No 10 AWG conductors for 20 amperes, 120-volt branch circuit home runs longer than 100 feet, and for 20 ampere, 277-volt branch circuit home runs longer than 200 feet. Neutral conductor shall be sized the same as corresponding phase conductors.
- D. Provide dedicated neutral conductor with each branch circuit, do not use a shared neutral conductor between phases unless specifically requested or directed.
- E. For remodel work or where shared neutrals are used by equipment such as system furniture, provide a breaker handle tie as required for the phases sharing the neutral conductor.
- F. Conductor length for parallel feeders shall be identical.
- G. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 – Raceways and Boxes for Electrical Systems prior to pulling conductors and cables.
- H. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- I. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- J. Couplings and conduit connectors shall have pre-insulated bushings in place prior to pulling wires.

- K. Splice only in accessible junction or outlet boxes. Splice in feeders and services are not permitted. Splice or taps in branch circuits permitted only in junction boxes where circuits divide.
- L. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- M. Support cables according to Section 26 05 29 – Hangers and Supports for Electrical Systems.
- N. Lace or clip groups of feeder conductors at distribution centers, pullboxes, and wireways.
- O. Provide copper grounding conductors and straps. A ground wire shall be pulled through conduits and used as the equipment grounding conductor.
- P. Wire and cable shall be brought to the job site in the original containers bearing the U.L. label.
- Q. Installing wires of different voltage systems in the same raceway, box, gutter or other enclosure is prohibited.
- R. Radius of cable bends shall not be less than ten times the outer diameter of the cable.

3.04 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Follow manufacturer's instructions using manufacturer's recommended tools.
- D. Stripping Insulation: Carefully strip, avoid nicking conductor. No "ringing".
- E. 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.
- F. Bare Connectors and Conductor Free Ends: Wrap with insulating rubber or friction tape to equivalent insulation of wire.
- G. Ground Continuity to Metallic Surfaces: Remove any paint coating and polish surface beneath connection.
- H. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
- I. No splices or taps permitted in feeder branch circuiting terminating at a single outlet.
- J. Conductor and cable copper shall not be reduced at the terminal for making connections.

3.05 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 - Identification for Electrical Systems.
- B. Color-coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - 1. Color shall be factory applied integral pigmentation or field applied for sizes larger than No. 6 AWG if authorities having jurisdiction permit. Where field applied, apply colored plastic tape in spiral half-lap over exposed conductor portions in manholes, boxes, panels, switchboards, and other enclosures.
 - 2. Colors for 208/120-V circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White with corresponding phase color stripe.
 - 3. Color for Equipment Grounds: Green
- C. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.06 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.
 - 2) Calibrated torque wrench.
 - c. Inspect compression-applied connectors for correct cable match and indentation.
 - d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.
 - f. Continuity test on each conductor and cable.
 - g. Uniform resistance of parallel conductors.
 - h. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300-volt rated cable and 1000 volts dc for 600-volt rated cable. Test duration shall be one minute.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- 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 2020 edition.

1.03 SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with 26 05 00 FL- General Electrical Provisions. Submittal requirements indicated by column number designation as follows:
 - 1. Materials List
 - 2. Catalog Data
 - 3. Product Data
 - 4. Performance Data
 - 5. Wiring Diagrams
 - 6. Shop Drawings
 - 7. Installation Instructions
 - 8. Special Requirement listed herein.

PRODUCT TABLE	1	2	3	4	5	6	7	8
Grounding conductors		X						

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.
- F. Receptacles - Refer to Section 26 27 26 – WIRING DEVICES.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Steel slotted support systems.
 - 2. Conduit and cable support devices.
 - 3. Support for conductors in vertical conduit.
 - 4. Structural steel for fabricated supports and restraints.
 - 5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
 - 6. Fabricated metal equipment support assemblies.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 - 2. Include rated capacities and furnished specialties and accessories.
- B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
 - 1. Hangers. Include product data for components.
 - 2. Slotted support systems.
 - 3. Equipment supports.
 - 4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated-Design Submittal: For hangers and supports for electrical systems.
 - 1. Include design calculations and details of hangers.
 - 2. Include design calculations for seismic restraints.

1.04 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design hanger and support system.
- B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified."
 - 2. Component Importance Factor: 1.0.
- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame Rating: Class 1.
 - 2. Self-extinguishing according to ASTM D 635.

2.02 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit; Atkore International.
 - b. CADDY; brand of nVent Electrical plc.
 - c. Haydon Corporation.
 - 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 - 4. Channel Width: Selected for applicable load criteria.
 - 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 8. Retain subparagraph below if retaining "Nonmetallic Coatings" or "Painted Coatings" Subparagraph above.
 9. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Hilti, Inc.
 - 2) Simpson Strong-Tie Co., Inc.
 2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 5. Toggle Bolts: All-steel springhead type.
 6. Hanger Rods: Threaded steel.

2.03 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 – Metal Fabrications for steel shapes and plates.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1.
 - 2. NECA 101
 - 3. NECA 111.
- B. Comply with requirements for raceways and boxes specified in Section 26 05 33 – Raceways and Boxes for Electrical Systems.
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC and RMC may be supported by openings through structure members, according to NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Retain first subparagraph below if powder-actuated devices are allowed. Consider deleting if Project contains both lightweight and standard-weight concrete or more than one thickness of concrete slab.
 - 6. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches

thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

7. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
8. To Light Steel: Sheet metal screws.
9. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05 50 00 – Metal Fabrications for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Boxes, enclosures, and cabinets.
 - 5. Handholes and boxes for exterior underground cabling.

1.03 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.04 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - 4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
- C. Source quality-control reports.

PART 2 - PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. Calconduit.
 - c. Thomas & Betts Corporation; A Member of the ABB Group.
 - d. Western Tube and Conduit Corporation.
 - e. Wheatland Tube Company.
 - 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 3. GRC: Comply with ANSI C80.1 and UL 6.
 - 4. IMC: Comply with ANSI C80.6 and UL 1242.
 - 5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
 - 6. EMT: Comply with ANSI C80.3 and UL 797.
- B. Metal Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - c. Thomas & Betts Corporation; A Member of the ABB Group.
 - d. Western Tube and Conduit Corporation.
 - e. Wheatland Tube Company.
 - 2. Comply with NEMA FB 1 and UL 514B.
 - 3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 4. Fittings, General: Listed and labeled for type of conduit, location, and use.
 - 5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 - 6. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew.
 - 7. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 8. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Anamet Electrical, Inc.
 - b. CANTEX INC.
 - c. Kraloy.
 - d. Thomas & Betts Corporation; A Member of the ABB Group.
 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. ENT: Comply with NEMA TC 13 and UL 1653.
 4. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
 5. LFNC: Comply with UL 1660.
- B. Nonmetallic Fittings:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anamet Electrical, Inc.
 - b. CANTEX INC.
 - c. Kraloy.
 - d. RACO; Hubbell.
 - e. Thomas & Betts Corporation; A Member of the ABB Group.
 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
 3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
 - a. Fittings for LFNC: Comply with UL 514B.
 4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.03 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. B-line, an Eaton business.
 2. Hoffman; a brand of nVent.
 3. MonoSystems, Inc.
 4. Square D.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 or Type 3R unless otherwise indicated, and sized according to NFPA 70.
1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.04 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Crouse-Hinds, an Eaton business.
 - 2. FSR Inc.
 - 3. Hoffman; a brand of nVent.
 - 4. Hubbell Incorporated.
 - 5. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 6. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep minimum.
- J. Gangable boxes are allowed.
- K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. Cabinets:
 - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.05 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 - 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Armorcast Products Company.
 - b. Oldcastle Infrastructure Inc.; CRH Americas.
 - c. Quazite; Hubbell Incorporated, Power Systems.
 - 2. Standard: Comply with SCTE 77.
 - 3. Configuration: Designed for flush burial with integral closed bottom unless otherwise indicated.
 - 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 - 5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 6. Cover Legend: Molded lettering, "ELECTRIC".
 - 7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 - 8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.06 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - 1. Tests of materials shall be performed by an independent testing agency.
 - 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 - 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Underground Conduit: RNC.
 - 3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Tunnels.
 - e. Shop Spaces.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Damp or Wet Locations: GRC
 - 6. Corrosive Environments: Type EPC-40-PVC
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 3. EMT: Use setscrew, fittings. Comply with NEMA FB 2.10.
 - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- G. Install surface raceways only where indicated on Drawings.
- H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.02 INSTALLATION

- A. Comply with requirements in Section 26 05 29 – Hangers and Supports for Electrical Systems for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.

- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- M. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- N. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- O. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- P. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- R. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- S. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

- U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Conduit extending from interior to exterior of building.
 - 4. Conduit extending into pressurized duct and equipment.
 - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - 6. Where otherwise required by NFPA 70.
- V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- W. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
 - 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - b. Attics: 135 deg F temperature change.
 - 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 - 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 - 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- BB. Locate boxes so that cover or plate will not span different building finishes.

- CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.03 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 for pipe less than 6 inches in nominal diameter.
 - 2. Install backfill as specified in Division 31.
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31.
 - 4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
 - 5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
 - 6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
 - 7. Underground Warning Tape: Comply with requirements in Section 26 05 53 – Identification for Electrical Systems.

3.04 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.05 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Raceway and Metal-Clad Cable
 - 2. Conductor, Communication and Control Cable
 - 3. Warning Labels and Signs
 - 4. Equipment Identification Nameplates
 - 5. Wiring Device Identification
 - 6. Miscellaneous Identification Products
 - 7. Pull box and junction box identification

1.03 RELATED SECTIONS

- A. Division 01, General Requirements
- B. Division 26, Electrical
- C. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables
- D. Section 26 05 33 – Raceways and Boxes for Electrical Systems
- E. Section 26 27 26 – Wiring Devices
- F. Section 26 29 13 – Motor Circuit Disconnects

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1 and IEEE C2.

- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 RACEWAY AND METAL-CLAD CABLE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Brady Corporation
 - 2. Ideal Industries, Inc.
 - 3. Marking Services, Inc.
 - 4. Seton
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible, labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
- C. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant, not less than 3 mils thick by 1 inches wide; compounded for outdoor use.
- D. Underground-Line Warning Tape:
 - 1. Pigmented, bright-colored, continuous printed polyethylene tape, compounded for direct-burial service.
 - 2. Detectable, embedded continuous metallic strip.
 - 3. Printed legend shall indicate type of underground line.
 - 4. Not less than 3 inches wide by 4 mils thick.
 - 5. Color: Orange tape for communication and red tape for electrical installations.

2.03 CONDUCTOR, COMMUNICATION AND CONTROL CABLE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Brady Corporation
 - 2. Panduit
 - 3. Ideal Industries, Inc.
 - 4. Marking Service, Inc.
 - 5. Seton
- B. Color-Coding Conductor Tape: Colored, heavy duty, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

- C. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

2.04 WARNING LABELS AND SIGNS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Brady Corporation
 - 2. Emedco
 - 3. Marking Service, Inc.
 - 4. Seton
- B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other equipment access, unless otherwise noted.
- C. Engraved Plastic Signs: Three-layer laminated acrylic or melamine plastic, minimum 1/16-inch thick for signs up to 20 square inches and 1/8-inch thick for sizes larger than 20 square inches.
 - 1. Engraved legend with white letters on black face.
 - 2. Drilled or punched for mechanical fasteners.
- D. Baked-Enamel Warning Signs (Interior): Preprinted aluminum signs, drilled or punched for mechanical fasteners with colors, legend, and size as required for application. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting. Nominal size, 7-inch by 10-inch.
- E. Metal-Backed, Butyrate Warning Signs (Exterior): Nonfading, weather-resistant, preprinted, cellulose-acetate butyrate signs with galvanized-steel backing; colors, legend, and size as required for application. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting. Nominal size, 10-inch by 14-inch.
- F. Warning label sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING – OSHA REGULATION – AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 inches."

2.05 EQUIPMENT IDENTIFICATION NAMEPLATES

- A. Engraved, Three-layer, Laminated Acrylic or Melamine Nameplate: Drilled or punched for mechanical fasteners. White letters on black background, except emergency equipment nameplates shall have white letters on red background. Beveled edges with minimum letter height of 1/2-inch unless otherwise noted.

2.06 WIRING DEVICE IDENTIFICATION

- A. Self-adhesive vinyl labels, machine printed with black 1/8 inch high text on clear background, except emergency wiring devices shall have black letters on red background, by thermal transfer or equivalent process.

2.07 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project. Labeling shall be reviewed and approved by the Owner's Authorized Representative.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

- K. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER"
 - 2. "POWER"
 - 3. "UPS"
- L. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- M. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- N. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- O. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- P. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- Q. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
 - 1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- R. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- S. Baked-Enamel Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.
- T. Metal-Backed Butyrate Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.
- U. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

3.03 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch-high, black letters on 20-inch centers.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, and at 10-foot maximum intervals.
- D. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- E. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER"
 - 2. "POWER"
 - 3. "UPS"
 - 4. "FIRE ALARM"
- F. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use identification specified herein. Identify source and circuit number of each set of conductors or other appropriate number or letter to facilitate future troubleshooting. For single conductor cables, identify phase in addition to the above. Phase identification shall be consistent throughout the system.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Junction Box Identification: Identify each junction box with complete system description, including system voltage, panel, and circuits contained within.
 - 1. Acceptable Identification Methods: Neat hand lettering with permanent black marker, machine printed, adhesive vinyl labels, or engraved nameplates.
 - 2. Acceptable Locations:
 - a. In concealed locations: Locate identification on outside of junction box cover.
 - b. In exposed locations: Locate identification on inside of junction box cover.
 - 3. Fire Alarm Junction Boxes: Box covers shall be painted red and labeled "FIRE ALARM" prior to installation.
- H. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use identification specified herein.

- I. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- J. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.
- K. Branch-Circuit Conductor Identification: On conductors and cables for receptacles and line voltage switches as specified herein.
- L. Wiring Device Plate Identification: Apply machine printed, self-adhesive vinyl labels at bottom center of device plate for single gang and multiple gang devices.
 - 1. Label shall provide branch circuit identification.
 - a. Example: "B-16" indicating panel "B" and circuit #16.
- M. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- N. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, voice, and data connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with contract documents, manufacturer's wiring diagrams, and Operation and Maintenance Manual.
- O. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- P. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:
 - 1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
 - 2. Wall surfaces directly external to raceways concealed within wall.
 - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- Q. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926. 403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- R. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Apply Baked-enamel warning signs. Identify system voltage with black letters on an orange background.
 - 1. Apply to exterior of door, cover, or other access.
 - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
- S. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction

signs with approved legend where instructions are needed for system or equipment operation.

- T. Equipment Identification Labels:
1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 2. Outdoor Equipment: Laminated acrylic or melamine sign.
 3. Install nameplates for equipment, including but not limited to, the following:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of an engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Switchgear.
 - e. Switchboards.
 - f. Transformers: Label that includes tag designation indicated on contract documents for the transformer, primary source, secondary load and location.
 - g. Substations.
 - h. Emergency system boxes and enclosures.
 - i. Motor-control centers.
 - j. Disconnect switches.
 - k. Enclosed circuit breakers.
 - l. Enclosed controllers.
 - m. Variable-speed controllers.
 - n. Push-button stations.
 - o. Power-transfer equipment.
 - p. Contactors.
 - q. Battery-inverter units.
 - r. Battery racks.
 - s. Power-generating units.
 - t. Monitoring and control equipment.
 - u. UPS equipment.
 4. Provide the following information on each nameplate:
 - a. Equipment name/tag:
 - 1) Matching the designation indicated on the contract documents, or identifying the load controlled or function of the equipment where no specific tag is shown on the contract documents unless otherwise noted.
 - b. Equipment operating voltage, phase, wiring configuration and ampacity
 - 1) Example: 480V/3PH/4W/225A
 - c. Source of power supply, including circuit number:
 - 1) Example: FED FROM 4NL1-3
- U. At service entrance equipment, provide a nameplate identifying the maximum available fault current and "as of" effective date.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Standard-grade receptacles, 125 V, 20 A.
 - 2. GFCI receptacles, 125 V, 20 A.
 - 3. Toggle switches, 120/277 V, 20A.
 - 4. Wall plates.

1.03 DEFINITIONS

- A. BAS: Building automation system.
- B. EMI: Electromagnetic interference.
- C. GFCI: Ground-fault circuit interrupter.
- D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- E. RFI: Radio-frequency interference.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 – PRODUCTS

2.01 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Comply with NEMA WD 1.

- E. Devices that are manufactured for use with modular plug-in connectors are not permitted.
- F. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.
- G. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: Grey.
- H. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.
- I. Quick connect, plug in or push in, modular receptacles are not allowed.

2.02 SPECIFICATION-GRADE RECEPTACLES, 125 V, 20 A

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hubbell Incorporated (Commercial and Industrial Group - Wiring Devices-Kellems).
 - 2. Leviton Manufacturing Co., Inc.
 - 3. Pass & Seymour/Legrand (Pass & Seymour).
- B. Duplex Receptacles, 125 V, 20 A:
 - 1. Description: Two pole, three wire, and self-grounding.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Standards: Comply with UL 498 and FS W-C-596.
- C. Weather-Resistant Duplex Receptacle, 125 V, 20 A:
 - 1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Standards: Comply with UL 498 and FS W-C-596.

2.03 GFCI RECEPTACLES, 125 V, 20 A:

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hubbell Incorporated (Commercial and Industrial Group - Wiring Devices-Kellems).
 - 2. Leviton Manufacturing Co., Inc.
 - 3. Pass & Seymour/Legrand (Pass & Seymour).
- B. Duplex Receptacles, 125 V, 20 A:
 - 1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Type Non-feed.
 - 4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
- C. Weather-Resistant, GFCI Duplex Receptacle, 125 V, 20 A:
 - 1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.

3. Type Non-feed.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

2.04 TOGGLE SWITCHES, 120/277 V, 20 A

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Hubbell Incorporated (Commercial and Industrial Group - Wiring Devices-Kellems).
 2. Leviton Manufacturing Co., Inc.
 3. Pass & Seymour/Legrand (Pass & Seymour).
- B. Single-, Two-Pole, Three- and Four-Way Switches, 120/277 V, 20 A:
 1. Standards: Comply with UL 20 and FS W-S-896.
- C. Pilot-Light, Single-Pole Switches, 120/277 V, 20 A:
 1. Description: Illuminated when switch is on.
 2. Standards: Comply with UL 20 and FS W-S-896.

2.05 WALL PLATES

- A. Single Source: Obtain wall plates from the same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for devices connected to normal source: Finished Spaces: 0.035-inch-thick, satin finished, Type 302 stainless steel.
 3. Material for Unfinished Spaces: Galvanized steel.
 4. Material for devices connected to Emergency (NEC 700) or Standby Power (NEC 701): smooth, rigid impact resistant, nylon/thermo-plastic.
 - a. Wall plate color: Red.
 5. Material for Damp Locations: Cast aluminum with spring-loaded lift cover and listed and labeled for use in wet and damp locations.
- C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.

- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking the solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 5. Where there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 20-A circuits, splice No. 12 AWG pigtails for devices connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
 - 10. Install toggle switches at 48 inches (to center line of faceplate) above finished floor with OFF position down, unless otherwise noted.
 - 11. Install receptacles at 18 inches (to center line of faceplate) above finished floor, unless otherwise noted.
 - 12. Verify mounting height and orientation of wiring devices above counter tops and benches with Architectural Details prior to rough-in.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.
- F. Device Plates:
 - 1. Do not use oversized or extra-deep plates.
 - 2. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush, level or do not cover rough wall opening.
 - 3. Where outlets are adjacent to each other at same mounting heights, install under common device plate, except where outlets are of different voltages, such as data and duplex receptacle, unless otherwise noted.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- H. Furnish and install wiring devices of number, rating and type shown.
- I. Devices to include appropriate outlet box, cover, wall plate and other necessary installation materials for a complete operating outlet.

- J. Back wiring wells may be used for receptacles.
- K. Grounding: Install a separate green or bare wire between the receptacle strap grounding (green) screw and a screw into the outlet box. Self-grounding strap not approved as grounding means.

3.02 GFCI RECEPTACLES

- A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.

3.03 IDENTIFICATION

- A. Comply with Section 26 05 53 – Identification for Electrical Systems.
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.04 FIELD QUALITY CONTROL

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Tests for Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 150A Load: A value of 6 percent or higher is not acceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the devices and its outlet box are securely mounted.
 - 6. Test shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units, and replace with new ones and retest as specified above.
- D. Wiring device will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION

SECTION 26 28 16

OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Circuit Breakers
- B. Fuses

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.
- 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.
- 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).

1.03 APPLICABLE REGULATIONS

- A. Underwriters' Laboratories (UL)
 - 1. UL 489-72 Molded Case Circuit Breakers and Circuit Breaker Enclosures
 - 2. UL 869 Service Disconnects
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 70 National Electrical Code

1.04 SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 26 05 00 – General Electrical Provisions. Submittal requirements indicated by column number designation as follows:
 - 1. Materials List
 - 2. Catalog Data
 - 3. Product Data
 - 4. Performance Data
 - 5. Wiring Diagrams
 - 6. Shop Drawings
 - 7. Installation Instructions
 - 8. Operating and Maintenance Data

PRODUCT TABLE	1	2	3	4	5	6	7	8
Molded case circuit breakers			X	X				X
Fuses			X	X				X

PART 2 - PRODUCTS

2.01 MOLDED CASE CIRCUIT BREAKERS

- A. Circuit Breakers:
1. Connection to Bus: Bolt-on
 2. Thermal-magnetic, molded case, with inverse time current overload and instantaneous magnetic tripping unless otherwise shown.
 3. Quick-make, quick-break, with tripped indication clearly shown by breaker handle taking a position between ON and OFF.
 4. Multi-pole breakers shall have a common internal trip. No handle ties between single pole breakers.
 5. Contacts: T-rated, for heavy duty switching applications
 6. Breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the breaker trip rating to prevent repeated arcing shorts resulting from frayed appliance cords.
 7. Additions to existing panelboards and switchboards shall match or be compatible with existing.
 8. Provide handle ties per NEC for breakers serving circuits with shared neutral conductors.
 9. Where used as service disconnects, breakers shall be listed for use as service entrance equipment.

2.02 FUSES

- A. UL Class RK-5 dual element, time delay, current limiting type. Silver plated contacts, brass ferrule, non-hygroscopic bodies. Sized in accordance with equipment manufacturer's requirements.
- B. Capable of holding 500 percent of rated current for a minimum of 10 seconds, and carry a UL listed minimum interrupting rating of 200,000A rms symmetrical.

PART 3 - EXECUTION

3.01 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.

3.02 FUSES

- A. Install fuses for motor protection to best protect the motor without nuisance tripping. Should fuse sizes require changing from what is indicated due to variance between the original design information and actual equipment installed, fuses sized in accordance with NEC. Do not size fuses smaller than the starter heaters on motor circuits.

- B. Provide one complete set of spare fuses of each amperage used on this project.

END OF SECTION

SECTION 26 29 13

MOTOR AND CIRCUIT DISCONNECTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- 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

1.04 SUBMITTALS

- A. Provide submittals for products listed in the Product Table below in accordance with Section 26 05 00 – General Electrical Provisions. Submittal requirements indicated by column number designation as follows:
 - 1. Materials List
 - 2. Catalog Data
 - 3. Product Data
 - 4. Performance Data
 - 5. Wiring Diagrams
 - 6. Shop Drawings
 - 7. Installation Instructions
 - 8. Special Requirement listed herein.

PRODUCT TABLE	1	2	3	4	5	6	7	8
Components			X	X				
Single phase manual motor controller			X	X				

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. Motor disconnects shall contain minimum 2 NO/NC control circuit disconnecting contacts interlocked with operating handle.
- G. Enclosure for Dry, Indoor Locations: NEMA 1 minimum. Enclosures for outdoor locations: NEMA 3R minimum. Others as required for location installed.

2.02 MANUAL MOTOR CONTROLLER, SINGLE PHASE

- A. Acceptable Manufacturer: Square D.
- B. General: Manual toggle switch with handle guard and lockoff, thermal overload relay, NEMA 1 surface mounted enclosure. Square D, Class 2510 or equal.

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.
- D. Clockwise phase rotation shall be tested and documented. Provide documentation of correct phasing for each motor.

END OF SECTION

SECTION 31 20 20

EARTH MOVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes:
 - 1. Excavating and filling for rough grading the Site.
 - 2. Preparing subgrades for slabs-on-grade, walks, pavements, turf, grasses and plants.
 - 3. Excavating and backfilling for buildings and structures.
 - 4. Drainage course for concrete slabs-on-grade.
 - 5. Subbase course for concrete walks and pavement.
 - 6. Subbase and base course for asphalt paving.
 - 7. Subsurface drainage backfill for walls and trenches.
 - 8. Excavating and backfilling trenches for utilities and pits for buried utility structures.
 - 9. Excavating well hole to accommodate elevator-cylinder assembly.
- B. Related Requirements:
 - 1. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

1.03 UNIT PRICES

- A. Work of this Section is affected by unit prices for earth moving specified in Section 012200 "Unit Prices."
- B. Quantity allowances for earth moving are included in Section 012100 "Allowances."
- C. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
 - 1. 24 inches (600 mm) outside of concrete forms other than at footings.
 - 2. 12 inches (300 mm) outside of concrete forms at footings.
 - 3. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
 - 4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - 5. 6 inches (150 mm) beneath bottom of concrete slabs-on-grade.
 - 6. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

1.04 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

- 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
 - B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
 - C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
 - D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
 - E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
 - F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices and changes in the Work.
 - 2. Bulk Excavation: Excavation more than 10 feet (3 m) in width and more than 30 feet (9 m) in length.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
 - G. Fill: Soil materials used to raise existing grades.
 - H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by a geotechnical testing agency, according to ASTM D 1586.
 - I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
 - J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
 - K. Subgrade: Uppermost surface of an excavation, or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
 - L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- 1.05 PREINSTALLATION MEETINGS
- A. Preinstallation Conference: Conduct pre-excavation conference at Eastern Oregon University.
 - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.

- b. Coordination of Work with utility locator service.
- c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
- d. Extent of trenching by hand or with air spade.
- e. Field quality control.

1.06 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Geotextiles.
 - 2. Controlled low-strength material, including design mixture.
 - 3. Warning tapes.
- B. Samples for Verification: For the following products, in sizes indicated below:
 - 1. Geotextile: 12 by 12 inches (300 by 300 mm).
 - 2. Warning Tape: 12 inches (300 mm) long; of each color.

1.07 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D 2487.
 - 2. Laboratory compaction curve according to ASTM D 698/ASTM D 1557.

1.08 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.09 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
- D. Do not commence earth moving operations until temporary site fencing and erosion- and sedimentation-control measures, specified in Section 311000 "Site Clearing" are in place.
- E. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.

4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Do not direct vehicle or equipment exhaust towards protection zones.
- G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.
- J. Sand: ASTM C 33; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.02 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
 - 3. Permittivity: 0.5 per second, minimum; ASTM D 4491.
 - 4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.03 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting flowable concrete material produced from the following:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I.
 - 2. Fly Ash: ASTM C 618, Class C or F.
 - 3. Normal-Weight Aggregate: ASTM C 33/C 33M, 3/4-inch (19-mm) nominal maximum aggregate size.
 - 4. Water: ASTM C 94/C 94M.
 - 5. Air-Entraining Admixture: ASTM C 260/C 260M.
- B. Produce conventional-weight, controlled low-strength material with 80-psi (550-kPa) compressive strength when tested according to ASTM C 495/C 495M.

2.04 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.02 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.03 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.04 EXCAVATION, GENERAL

- A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavations specified in See Section 311000 "Site Clearing."
 - a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
 - 2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. exterior waterproofing treatments.
 - b. 6 inches 24 inches (600 mm) outside of concrete forms other than at footings.
 - c. 12 inches (300 mm) outside of concrete forms at footings.
 - d. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
 - e. Outside dimensions of concrete walls indicated to be cast against rock without forms or (150 mm) beneath bottom of concrete slabs-on-grade.
 - f. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

3.05 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.07 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Underground systems shall be buried in a trench not less than two feet deeper than the top of the pipe and not less than eighteen inches wider than the combined O.D. of all piping systems. A minimum thickness of 24 inches of compacted backfill placed over the top of the pipe will meet H-20 highway loading. Trench bottom shall have a minimum of 6" of sand, pea gravel, or specified backfill as a cushion for the piping.
- C. Trenches in Tree- and Plant-Protection Zones:
1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.08 SUBGRADE INSPECTION

- A. Notify Architect and Soils Engineer when excavations have reached required subgrade.
- B. If Soils Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes) to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Soils Engineer, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.09 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.

- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
- D. Trenches under Roadways: Provide 4-inch-(100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete".
- E. Backfill voids with satisfactory soil while removing shoring and bracing.
- F. Initial Backfill:
 - 1. Soil Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
 - 2. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the pipe or conduit. Coordinate backfilling with utilities testing.
- G. Final Backfill:
 - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
 - 2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- H. Warning Tape: Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698/ASTM D 1557:
 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at least 92 percent.
 3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at least 85 percent.
 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following tolerances:
 1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm)
 2. Walks: Plus or minus 1 inch (25 mm)
 3. Pavements: Plus or minus 1/2 inch (13 mm)
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

- A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch (150-mm) course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches (300 mm) of filter material, placed in compacted layers 6 inches (150 mm) thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.
- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade, in compacted layers 6 inches (150 mm) thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).
 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.

3.18 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
 1. Place base course material over subbase course under hot-mix asphalt pavement.
 2. Shape subbase and base course to required crown elevations and cross-slope grades.
 3. Place subbase and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
 4. Place subbase and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
 5. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698 /ASTM D 1557.
- C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95percent of maximum dry unit weight according to ASTM D 698/ASTM D 1557.

3.19 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 1. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
 2. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
 3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 2. Determine that fill material classification and maximum lift thickness comply with requirements.
 3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.
 2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes construction dewatering.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for excavating, backfilling, site grading, and controlling surface-water runoff and ponding.
 - 2. Oregon Standard Specification for Construction, latest edition, as applicable.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review condition of site to be dewatered including coordination with temporary erosion-control measures and temporary controls and protections.
 - 3. Review geotechnical report.
 - 4. Review proposed site clearing and excavations.
 - 5. Review existing utilities and subsurface conditions.
 - 6. Review observation and monitoring of dewatering system.

1.04 ACTION SUBMITTALS

- A. Shop Drawings: For dewatering system, prepared by or under the supervision of a qualified Oregon licensed professional engineer. When groundwater control extends below the groundwater table or when dewatering has the potential to affect adjacent improvements.
 - 1. Include plans, elevations, sections, and details.
 - 2. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
 - 3. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
 - 4. Include written plan for dewatering operations including sequence of well and well-point placement coordinated with excavation shoring and bracings and control procedures to be adopted if dewatering problems arise.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and professional engineer.
- B. Field quality-control reports.

- C. Existing Conditions: Using photographs or video recordings, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by dewatering operations. Submit before work begins.
- D. Record Drawings: Identify locations and depths of capped wells and well points and other abandoned-in-place dewatering equipment.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that specializes in design of dewatering systems and dewatering work.

1.07 FIELD CONDITIONS

- A. Project-Site Information: Piezometer locations and data have been provided in Section 00 30 00 Available Information, Attachments 2&3.
- B. Survey Work: When directed by the qualified engineer or when excavation occurs adjacent to pavements, utilities, structures, or adjacent buildings, engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
- C. Contractor acknowledges that groundwater has been observed near proposed excavation elevations. Contractor is responsible for verifying site conditions and designing a dewatering system sufficient to meet the performance requirements for pipe laying excavation, subgrade preparation, bedding and backfill, including the prevention of floating of the pipe.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
 - 1. Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, when required by site conditions.
 - 2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, prevention of flooding in excavation, and prevention of damage to subgrades and permanent structures.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 5. Remove dewatering system when no longer required for construction.
 - 6. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with water- and debris-disposal regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site or surrounding area.
 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.

3.02 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
1. Space well points or wells at intervals required to provide sufficient dewatering.
 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Place dewatering system into operation to lower water to specified levels before excavating below ground-water level.
- C. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- D. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.03 OPERATION

- A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
 2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 3. Maintain piezometric water level a minimum of 24 inches (600 mm) below bottom of excavation, unless otherwise approved by the Contractors qualified engineer based on observed soil and groundwater conditions.
- C. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.
- D. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.

- A. Observation Wells: Provide observation wells or piezometers, take measurements, and maintain at least the minimum number indicated; additional observation wells may be required by authorities having jurisdiction.
 - 1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
 - 2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
 - 3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.
- B. Survey-Work Benchmarks: When directed by the Contractors qualified engineer or when excavation occurs adjacent to pavements, utilities, or structures, resurvey benchmarks regularly to maintain an accurate log of surveyed elevations.
- C. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.
- D. Prepare reports of observations.

3.05 PROTECTION

- A. Protect and maintain dewatering system during dewatering operations.
- B. Promptly repair damages to adjacent facilities caused by dewatering.

PART 4 - MEASUREMENT AND PAYMENT

4.01 PERFORMANCE REQUIREMENTS

- A. Dewatering will be measured and paid for as specified in the Bid Schedule.
- B. Payment includes full compensation for furnishing, installing, operating, monitoring, maintaining, and removing dewatering systems; providing standby equipment; obtaining any required permits, complying with discharge requirements, providing and required treatment, monitoring groundwater levels, and restoring the site.
- C. Dewatering required to meet the performance requirements of this section is not incidental to excavation and will be paid for under dewatering bid items.
- D. Payment
 - 1. Dewatering System – Mobilization, Installation, and Removal Unit: Lump Sum
 - 2. Dewatering System – Operation and Maintenance Unit: Calendar Day
 - a. Calendar Day measurement will begin only after dewatering systems are installed, operations, and when the Owner's Engineer determine dewatering is no longer required for active construction.
 - b. Calendar Day dewatering will not be paid for days when dewatering is required solely due to Contractor's failure to maintain planed production, resequencing for Contractor convenience, equipment downtime without standby capacity, or other Contractor-caused delays, as determined by the Owner or Owner's Engineer.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes Concrete Paving.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or epoxy adhesive.
 - 8. Joint fillers.

1.06 QUALITY ASSURANCE

- A. Stamped Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.

- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturer ready-mixed concrete products that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.07 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- C. Hot-Weather Concrete Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.01 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves with a radius 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.
- E. Plain Steel Wire: ASTM A 82/A 82M, as drawn.
- F. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60(Grade 420). Cut bars true to length with ends square and free of burrs.
- G. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- H. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- J. Zinc Repair Material: ASTM A 780.

2.03 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, gray portland cement Type I/II or Type III. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
 - 1. Aggregate Sizes: 1/2 to 3/4 inch (13 to 19 mm) nominal.

- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 3. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
 - 1. Color: As selected by Architect from manufacturer's full range.
- G. Water: Potable and complying with ASTM C 94/C 94M.

2.04 FIBER REINFORCEMENT

- A. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

2.05 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. (305 g/sq. m) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

2.06 RELATED MATERIALS

- A. Joint-Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.07 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixes or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use plasticizing and retarding admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash or Pozzolan: 25 percent.
 2. Ground Granulated Blast-Furnace Slag: 50 percent.
 3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- D. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- F. Concrete Mixtures: Normal-weight concrete.
 1. Compressive Strength (28 Days): 4000 psi (27.6 MPa).
 2. Maximum W/C Ratio at Point of Placement: 0.50.
 3. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm).
 4. Solar Reflectance Index: Not less than 29.

2.08 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.
 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C) reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 1. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
 - 2. Proof-roll with a pneumatic-tired and loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons (13.6 tons).
 - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

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

3.03 EDGE FORMS AND SCREED CONSTRUCTION

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

3.04 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.
- F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap of adjacent mats.

3.05 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of paving strips, unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 50 feet (15.25 m), unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete paving:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6-mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - a. Tolerance: Ensure that grooved joints are within 3 inches (75 mm) either way from centers of dowels.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-(3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - a. Tolerance: Ensure that sawed joints are within 3 inches (75 mm) either way from centers of dowels.
 - 3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.06 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Screed pavement surfaces with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.07 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power

units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.08 SPECIAL FINISHES

- A. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in paving surface as follows:
 1. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
- B. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions and as follows:
 1. Uniformly spread 40 lb/100 sq. ft. (19.5 kg/10 sq. m) of dampened, slip-resistive aggregate over paving surface in two applications. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
 2. Uniformly distribute approximately two-thirds of slip-resistive aggregate over paving surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second slip-resistive aggregate application, uniformly distributing remainder of material at right angles to first application to ensure uniform coverage, and embed by power floating.
 3. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
 4. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.

3.09 DETECTABLE WARNING INSTALLATION

- A. Blockouts: Form blockouts in concrete for installation of detectable paving units specified in Section 321726 "Tactile Warning Surfacing."
 1. Tolerance for Opening Size: Plus 1/4 inch (6 mm), no minus.
- B. Cast-in-Place Detectable Warning Tiles: Form blockouts in concrete for installation of tiles specified in Section 321726 "Tactile Warning Surfacing." Screed surface of concrete where tiles are to be installed to elevation, so that edges of installed tiles will be flush with surrounding concrete paving. Embed tiles in fresh concrete to comply with Section 321726 "Tactile Warning Surfacing" immediately after screeding concrete surface.
- C. Stamped Detectable Warnings: Install stamped detectable warnings as part of a continuous concrete paving placement and according to stamp-mat manufacturer's written instructions.
 1. Before using stamp mats, verify that the vent holes are unobstructed.
 2. Apply liquid release agent to the concrete surface and the stamp mat.
 3. Trimming: After 24 hours, cut off the tips of mortar formed by the vent holes.

4. Remove residual release agent according to manufacturer's written instructions, but no fewer than three days after stamping concrete. High-pressure-wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.

3.10 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.

3.11 PAVING TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 1. Elevation: 3/4 inch (19 mm).
 2. Thickness: Minimum 4" thickness
 3. Surface: Gap below 10-foot-(3-m-) long, unleveled straightedge not to exceed 1/2 inch (13 mm).
 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).
 5. Vertical Alignment of Dowels: 1/4 inch (6 mm).
 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
 8. Joint Spacing: 3 inches (75 mm).
 9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
 10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform field tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least 1 composite sample for each 5000 sq. ft. (465 sq. m) or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.13 REPAIRS AND PROTECTION

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

END OF SECTION

SECTION 32 91 19
LANDSCAPE GRADING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section covers all work necessary to place finish grade, remove or handle all rock encountered subsequent to clearing and rough grading, remove grass, weeds or other foreign objects and detrimental substances, soil handling and general preparation of planting areas as denoted on plan.

1.02 PROTECTION

- A. Protect existing plant materials to be preserved as denoted on plan, and other features such as fences, roads, sidewalks, paving, and curbs as final work.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Topsoil shall comply with Section 32 91 00.

PART 3 - EXECUTION

3.01 EQUIPMENT

- A. Contractor shall furnish and maintain earth-moving and compaction equipment in satisfactory condition and shall operate such equipment as necessary to control uniform density, and smoothness.

3.02 INSPECTION

- A. Verify site conditions and note irregularities affecting work in this section. B. Beginning work of this section means acceptance of existing conditions.

3.03 SUBSOIL PREPARATION

- A. Eliminate uneven areas and low spots. Remove subsoils contaminated with chemical compounds deleterious to healthy plant growth.

3.04 EXCAVATION HANDLING

- A. Remove all foreign matter obtained from site soil cleaning, screening and/or picking process from the site and legally dispose of as required by the appropriate jurisdiction. Dispose of all waste off-site.

3.05 PLACEMENT

- A. If possible, source of topsoil for finish grading shall be stockpiled site soils, placed by earlier contract phases.
- B. Minimum topsoil depths: 12" depth for all playfields and a minimum of 12" depth for shrub/planter bed areas. Provide 24" over minimum 6" compacted ½" minus drainage rock when located over solid and or unfractured rock.
- C. All landscaped fill areas shall be constructed in lifts not exceeding 12 inches in loose depth using site topsoil. Each lift shall be uniformly compacted to the specified density (85% minimum compaction).
- D. Topsoil placement shall not be performed when satisfactory results cannot be obtained due to rain freezing weather, or other unsatisfactory conditions.
- E. All areas to be planted shall be graded and floated to eliminate water holding depressions and pockets.
- F. All planted areas shall be machine or hand worked to eliminate objectionable lumps and soil clods, as deemed necessary by the Owner's Representative. Tillage shall include the removal of all equipment ruts and tracks, areas of compaction or erosion, and any other undesirable soil conditions which would prevent the proper formation of a finely pulverized seedbed, as directed by Owner's Representative.
- G. Undulations and unsightly variations in grade that will not permit the use of normal mowing equipment without scalping or missing shall be re-graded and floated to smooth surfaces and uneven watering.
- H. Grading tolerance shall be within $\pm .10$ foot from rough grades. All areas shall be graded to provide positive drainage away from structures. Owner's Representative shall review grades prior to contractor proceeding with further construction, irrigation or planting.

3.06 UTILITY PROTECTION

- A. Contractor shall be responsible for protecting all existing water lines, underground utilities and any other subsurface features while excavating and working on the project site.

END OF SECTION

SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

- A. Grass sod grown on agricultural land that is commercially cultivated specifically for turf sod.
 - 1. Furnish sod that is free of weeds, diseases, harmful nematodes and insects.
 - 2. Provide sod that is mature, not less than 10 months old, and machine cut to a uniform thickness of 5/8 inch or more, excluding top growth and thatch. Broken pieces and torn or uneven ends will not be accepted.
 - 3. Plant sod within 12-24 hours of harvest.
- B. Contractor shall notify EOU staff not less than 24 hours in advance of any seeding or sodding operation. Do not begin work until the prepared slopes have been approved for sodding. Following approval, begin sodding immediately and continue sodding the project slopes as they become ready. Do not perform sodding when ground is frozen, excessively wet, or otherwise not tillable.
- C. Fertilizer: Deliver fertilizers in separate or mixture containers that have the percentage of total nitrogen, available phosphoric acid, and water-soluble potash (NPK) in the amounts specified. Label each container with a quality compliance certificate that includes the container mass (weight), the percentage of each ingredient, and the source of each component in the mixture. Ensure that each container is labeled with a Quality Compliance Certificate. Furnish fertilizer according to State and Federal regulations. Fertilizer is subject to testing by the State Department of Agriculture.

1.02 WARRANTY

- A. Sod areas must be in healthy condition at end of a one-year warranty period, or for one full growing season from Substantial Completion, whichever is longer.
- B. Contractor assumes liability for all sod areas against disease, insect infestation, desiccation, sun scald, freeze damage, or any other condition that would cause plants to be unhealthy or to die through substantial completion
- C. Contractor is not responsible for damage to sod areas due to vandalism, theft, or accidental damage from pedestrians during the warranty period.
- D. Maintenance and warranty period shall begin after Substantial Completion and Landscape inspection acceptance
- E. At the time of final inspection, the EOU staff reserve the right to postpone acceptance until that time in the future when positive acceptance or rejection can be determined.

- F. Final Acceptance must be obtained in writing from EOU staff at the end of the Warranty period.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Hydro Mulch at a rate of 50 lbs./1,000 s.f.:
 - 1. Material: Virgin wood cellulose fiber containing no growth or germination inhibiting factors.
 - 2. Acceptable Wood Fiber Mulches: Silva-Fiber by Weyerhaeuser, Hydro Mulch by Conwed Corp., Spray Mulch by Spray Mulch Industries or approved equal.
 - 3. Application rates based on dry fiber mass (weight).
- B. Sod: Sod mix as specified on plans.
- C. Fertilizer: Commercial starter fertilizer shall contain the following percentages by weight at a rate of 10 lbs./1,000 s.f.:
 - 1. 10% Nitrogen
 - 2. 30% Phosphorus
 - 3. 10% Potassium
- D. Tracer – For Hydro mulch application, include green dye for visibility.
- E. Tackifier – Dry Powder Organic Tackifier. “Supertack” manufactured by Rantec Corporation or approved equal at a rate specified below:
 - 1. Slopes flatter than 1V:3H – Apply at rate of 1 lb./1,000 s.f.
 - 2. Slopes 1V:3H or Steeper – Apply at rate of 2 lbs./1,000 s.f.
- F. Lime: Agricultural ground limestone.

2.02 EQUIPMENT

- A. Hydro Seeding Equipment:
 - 1. Hydraulic Equipment: Continuous mixing and agitating action to mix water, seed, fertilizer, tackifier, and mulch
- B. Temporary Fence:
 - 1. Sodded areas to use Plastic Snow Fence (min. 5' in height) and seeded areas to use a temporary chain link fence (min. 5' in height) removed after established lawn is suitable for typical use, as determined by BLSD.
 - 2. Warning Signs: 8-1/2 by 11 inches, wrapped in plastic or waterproof, with one inch high letters.
 - 3. Sign Copy: THANK YOU FOR NOT WALKING ON GRASS

PART 3 - EXECUTION

3.01 PERFORMANCE

- A. Verification of Conditions:
 - 1. Inspect topsoil in new lawn areas.
 - 2. Verify compliance with required soil preparation, compaction, grades, slope to drains, and completion of underground utility lines in lawn areas.

3. Start of lawn planting Work indicates acceptance of subgrade and topsoil conditions.
- B. Protection of Adjacent Surfaces Prior to Sodding:
 1. Protect existing utility systems, paving, walks, curbs, and other site improvements from damage during sodding.
- C. Surface Preparation for Sodding
 1. Remove hard or soft topsoil areas and adjust grade of topsoil where required.
 2. Roll planting area with roller not exceeding 112 lbs.
- D. Hydro Seeding:
 1. Water all planting areas thoroughly to saturate upper layers of soil prior to the hydro seeding operation. Allow the planting area soil surface to dry out for one day only prior to the hydro seeding application. Exercise care not to allow the soil surface to be overly saturated with water prior to the hydro seeding application. At the same time the soil surface should not become too dry during this period. There should be some residual moisture within the first $\frac{1}{4}$ inch of the soil surface.
 2. Notify the EOU staff not less than 24 hours in advance to be present at start of hydro seeding application.
 3. Apply the hydro seeding in the form of a slurry hydromulch, seed, fertilizer, tackifier, and tracer in one application to prepared planting areas.
 4. Do not let the hydro seeding slurry components in the hydro seeding machine for more than two (2) hours because of possible seed destruction. If slurry components are left for more than two hours in the machine, add 50% more of the approved seed mix to any slurry mixture which has not been applied within the two hours after mixing. Add 75% more of the approved seed mix to any slurry mixture which has not been applied within the eight (8) hours after mixing. All mixtures more than eight (8) hours old, must be disposed, off-site, at the contractor's expense.
 5. Spray the area with a uniform visible coat, using the dark color tracer. The slurry shall be applied in a downward drilling motion via a fan stream nozzle. Insure that all of the slurry components enter and mix with the soil. Insure the uniformity of the hydro seed application.
 6. Exercise special care to prevent any of the slurry from being sprayed onto any hardscape areas including concrete walks, fences, walls, buildings, etc. Remove all slurry sprayed onto these surfaces at the contractor's expense.
 7. Do not seed within 24 inches from base of trees.
- E. Sodding:
 1. Fertilizer shall be spread and raked in. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and tightly against each other.
 2. Tight butt sod joints and overlap cross joints of succeeding sod rows by one-half.
 3. Trim corners and edges to a precise fit.
 4. Pin sod with wire loops into soil to prevent slippage on slopes greater than 2 inches drop in 12 inches.
 5. Landscape contractor shall water sod immediately after transplanting to prevent excessive drying during progress of work. As sodding is completed in any one section, the entire area shall be rolled. It shall then be thoroughly watered to a depth sufficient that the underside of the new sod pad and soil immediately below are thoroughly wet. The Landscape Contractor shall be responsible for

having adequate water available at the site prior to and during the sod transplanting.

6. Do not sod within 36 inches from base of trees.

3.02 COMPLETION

- A. Adjusting and Cleaning:
 1. Remove and replace defective sod to obtain even distribution.
 2. Contractor may adjust method of seeding application only when written request is acceptable to Owner's Representative.
 3. Repair or replace irrigation system components damaged during lawn sodding.
 4. At completion of Work in each area, remove debris, equipment, and surplus materials.
 5. Wash walks, walls, and paving areas adjacent to lawn areas to remove seed, mulch, and soil materials from exposed surfaces.
- B. Installation of Temporary Fence:
 1. Install temporary fence at perimeter of lawn areas.
 2. Install posts at 10 feet on center maximum, to a depth of 12 inches.
 3. Install warning signs on posts at 50 foot intervals with minimum of one sign on each side of each lawn area.
 4. Remove fence when lawn areas are established.
 5. Install temporary chain link fence per manufacturer's specifications.

3.03 RECONDITIONING LAWNS

- A. Use sod to recondition existing lawn areas damaged by contractor's operations including storage of materials or equipment and movement of vehicles.

END OF SECTION

SECTION 33 05 63

CONCRETE VAULT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This specification covers the materials for and manufacture of precast reinforced concrete units produced in accordance with the plans and these specifications.

1.02 REFERENCES - Where applicable, the latest editions of the following standards shall be considered a part of these specifications. In case of conflict, these specifications shall take precedence over the listed standard. (See also Article 2.4, Concrete Materials)

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. "Standard Specification for Highway Bridges"
 - 2. "Guide Specifications for Structural Design of Sound Barriers"
- B. ACI 304 – Guide for Measuring, Mixing, Transporting and Placing Concrete
- C. ACI 318 - Building Code Requirements for Reinforced Concrete
- D. ASTM C478 - Specification for Precast Reinforced Concrete Manholes Sections
- E. ASTM C825 - Standard Specification for Precast Concrete Barriers
- F. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
- G. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures"
- H. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
- I. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures
- J. ASTM C915 - Standard Specification for Precast Reinforced Concrete Crib Wall Members
- K. ASTM C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
- L. ASTM C936 - Standard Specification for Solid Concrete Interlocking Paving Units
- M. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
- N. ASTM C1227 - Standard Specification for Precast Concrete Septic Tanks
- O. ASTM 1433 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers

- P. ASTM C1478 - Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
- Q. AWS D1.1 - Structural Welding Code - Structural Steel
- R. AWS D1.4 - Structural Welding Code - Reinforcing Steel
- S. CRSI Manual of Standard Practice

1.03 FRANCHISE PRODUCTS

- A. Products manufactured under franchise arrangements shall conform to all the requirements specified by the franchiser. Items not included in the franchise specification but included in this specification shall conform to the requirements in this specification.

1.04 SUBMITTALS

- A. Product Data
 - 1. For standard precast concrete units, the precast concrete producer will supply cut sheets showing conformance to project drawings and requirements and to applicable ASTM specifications listed in this specification. The Precast concrete producer shall certify that such products will meet the ASTM specifications.
 - 2. For proprietary precast concrete units, the precast concrete producer may supply standard plans or informative literature. Supporting calculations and design details shall be available upon request. The Precast concrete producer shall warrant that such products will perform the intended task.
- B. Shop Drawings
 - 1. The plans for custom-made precast concrete units shall be shop drawings furnished by the precast concrete producer for approval by the Owner or his agent (specifier). These drawings shall show complete design, installation, and construction information in such detail as to enable the Owner to determine the adequacy of the proposed units for the intended purpose. Details of steel reinforcement size and placement as well as supporting design calculations, if appropriate, shall be included. The drawings shall include a schedule, which will list the size and type of precast concrete units at each location where they are to be used. The precast concrete units shall be produced in accordance with the approved drawings.

1.05 QUALITY ASSURANCE

- A. Precast concrete producer shall demonstrate adherence to the standards set forth in the National Precast Concrete Association Quality Control Manual. Precast concrete producer shall meet requirements written in subparagraph 1 or 2.
 - 1. NPCA Certification - The precast concrete producer shall be certified by the National Precast Concrete Association's Plant Certification Program prior to and during production of the products for this project.
 - 2. Qualifications, Testing and Inspection
 - a. The Precast concrete producer shall have been in the business of producing precast concrete products similar to those specified for a minimum of 5 years. The precast concrete producer shall maintain a permanent quality control department or retain an independent testing agency on a continuing basis. The agency shall issue a report, certified by a licensed engineer, detailing the ability of the precast concrete producer to produce quality products consistent with industry standards.

- b. The Precast concrete producer shall show that the following tests are performed in accordance with the ASTM standards indicated. Tests shall be performed for each 150 cu. yd. of concrete placed, but not less frequently than once per week.
 - 1) Slump: C143
 - 2) Compressive Strength: C31, C192, C39
 - 3) Air Content (when air-entrained concrete is being used): C231 or C173
 - 4) Unit Weight: C138
- c. The Precast concrete producer shall provide documentation demonstrating compliance with this subparagraph.
- d. The Owner may place an inspector in the plant when the products covered by this specification are being manufactured.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Handling
 - 1. Products shall be stored, handled shipped and unloaded in a manner to minimize damage.
 - 2. Lifting holes or inserts shall be consistent with industry standards. Lifting shall be accomplished with methods or devices intended for this purpose.
- B. Acceptance at Site
 - 1. The Owner's representative shall make final inspection and acceptance of the precast concrete products upon arrival at the jobsite.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The precast concrete manufacturer must meet the guidelines written in article 1.5 paragraph A.

2.02 MANUFACTURED PRECAST UNITS

- A. Precast Concrete: Provide all units shown in Contract Documents and as needed for a complete and proper installation
- B. Design Criteria - Design units in accordance with:
 - 1. Oregon building code.
 - 2. ACI 304 and 318.
 - 3. CRSI Manual of Standard Practice.
 - 4. Applicable ASTM Standard(s).
- C. Finishes
 - 1. Formed non-architectural surfaces: Surfaces cast against approved forms using industry practice in cleaning forms, designing concrete mixes, placing and curing concrete. Normal color variations, form joint marks, small surface holes caused by air bubbles and minor chips and spalls will be tolerated but no major imperfections, honeycombs or other defects will be permitted.
 - 2. Unformed surfaces: Surfaces finished with a vibrating screed, or by hand with a float. Normal color variations, minor indentations, minor chips and spalls will be tolerated but no major imperfections, honeycombs, or other defects shall be permitted.
 - 3. Special finishes:
 - a. Troweled, broom or other finishes shall be according to the requirements of project documents and performed per industry standards or supplier

specifications.

- b. Precast concrete producers shall submit finishes for approval when required by the project documents. The sample finishes shall be approved prior to the start of production.

D. Patching and Repairs

1. No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.
2. Repairing Minor Defects - Defects that will not impair the functional use or expected life of a manufactured precast concrete product may be repaired by any method that does not impair the product.
3. Repairing Honeycombed Areas - When honeycombed areas are to be repaired, all loose material shall be removed and the areas cut back into essentially horizontal or vertical planes to a depth at which coarse aggregate particles break under chipping rather than being dislodged. Proprietary repair materials shall be used in accordance with the manufacturer's instructions. If a proprietary repair material is not used, the area shall be saturated with water and, immediately prior to repair, the area should be damp, but free of excess water. A cement-sand grout or an approved bonding agent shall be applied to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.
4. Repairing Major Defects - Defects in precast concrete products which impair the functional use or the expected life of products shall be evaluated by qualified personnel to determine if repairs are feasible and, if so, to establish the repair procedure.

2.03 MATERIALS

- A. Concrete - Concrete shall be a uniform mix of quality materials listed in Article 2.4. Mix proportions shall be determined by following the standards in ACI 318 Chapter 5. Recommendations for selecting proportions for concrete are given in detail in Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete (ACI 211.1). Recommendations for lightweight concrete are given in Standard Practice for Selecting proportions for Structural Lightweight Concrete (ACI 211.2).
 1. Water-Cement Ratio
 - a. Concrete that will be exposed to freezing and thawing shall contain entrained air and shall have water-cement ratios of 0.45 or less. Concrete which will not be exposed to freezing, but which is required to be watertight, shall have a water-cement ratio of 0.48 or less if the concrete is exposed to fresh water, or 0.45 or less if exposed to brackish water or sea water. For corrosion protection, reinforced concrete exposed to deicer salts, brackish water or seawater shall have a water-cement ratio of 0.40 or less.
 2. Air Content
 - a. The air content of concrete that will be exposed to freezing conditions shall be within the limits given in Table 1.

Table 1 Total Air Content For Frost-Resistant Concrete

Nominal Maximum Aggregate Size (inches)	Severe Exposure	Air Content, %Moderate Exposure
3/8	6.0 to 9.0	4.5 to 7.5
1/2	5.5 to 8.5	4.0 to 7.0
3/4	4.5 to 7.5	3.5 to 6.5
1	4.5 to 7.5	3.0 to 6.0
1-1/2	4.5 to 7.0	3.0 to 6.0

* For specified compressive strengths greater than 5000 psi, air content may be reduced 1%.

3. Compressive Strength

- a. All concrete shall develop a minimum compressive strength of 4,000 psi in 28 days unless other strengths are designated on the drawings.

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

C. Aggregates: ASTM C33 or C330.

D. Water: Potable or free of deleterious substances in amounts harmful to concrete or embedded metals.

E. Admixtures:

1. Air-entraining: ASTM C260
2. Water reducing, retarding, accelerating, high range water reducing: ASTM C494
3. Pozzolans, fly ash and other mineral admixtures: ASTM C618
4. Ground granulated blast furnace slag: ASTM C989
5. Pigments: Non-fading and lime-resistant

2.04 REINFORCEMENT AND CONNECTION MATERIALS

A. Provide all reinforcement, accessory and connection materials required. Concrete reinforcement shall be steel bars or welded wire fabric, or a combination thereof.

B. Reinforcing Bars:

1. Deformed Billet-steel: ASTM A615
2. Deformed Rail-steel: ASTM A616
3. Deformed Axle-steel: ASTM A617
4. Deformed Low-alloy steel: ASTM A706

C. Reinforcing Wire:

1. Plain Wire: ASTM A82
2. Deformed Wire: ASTM A496

D. Welded Wire Fabric:

1. Plain Wire: ASTM A185
2. Deformed Wire: ASTM A497

- E. Epoxy Coated Reinforcement:
 - 1. Reinforcing Bars: ASTM A775
 - 2. Wires and Fabric: ASTM A884
- F. Galvanized Reinforcement:
 - 1. Reinforcing Bars: ASTM A767
- G. Inserts and Embedded Metal - All items embedded in concrete shall be of the type required for the intended task, and meet the following standards:
 - 1. Structural steel plates, angles, etc: ASTM A36
 - 2. Proprietary items: In accordance with manufacturers published literature
 - 3. Welded studs: AWS D1.1
 - 4. Finishes (as required):
 - a. Shop primer: Manufacturers' standards
 - b. Hot-dipped galvanized: ASTM A152
 - c. Zinc-rich coating: MIL-P-2135 self-curing, one component, sacrificial
 - d. Cadmium coating: Manufacturers' recommendations
- H. Joint Sealant and Joint Gaskets:
 - 1. Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets: ASTM C443.
 - 2. External Sealing Bands for Noncircular Sewer, Storm Drain, and Culvert Pipe: ASTM C877.
 - 3. Joints for Concrete Pipe, Manholes, and Manufactured Box Sections Using Preformed Flexible Joint Sealants: ASTM C990
 - 4. Specification for Elastomeric Joint Sealants: ASTM C920
- I. Pipe Entry Connectors:
 - 1. Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals: ASTM C923.
- J. Grout:
 - 1. Cement grout: Portland cement with enough water for the required strength and sand for proper consistency. May contain mineral or chemical admixtures, if approved by Owner's representative.
 - 2. Non-shrink grout: Premixed, packaged expansive and non-expansive shrink-resistant grout.

2.05 FABRICATION

- A. Forms for manufacturing precast concrete products shall be of the type and design consistent with industry standards. They should be capable of consistently providing uniform products and dimensions. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected can cause no product damage.
 - 1. Forms shall be cleaned of concrete build-up after each use.
 - 2. Form release agents shall not be allowed to build up on the form casting surfaces.
- B. Reinforcement
 - 1. Cages of reinforcement shall be fabricated either by tying the bars, wires or welded wire fabric into rigid assemblies or by welding where permissible in accordance with AWS D1.4. Reinforcing shall be positioned as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 in. Concrete cover shall not be less

than 1/2 in. Positive means shall be taken to assure that the reinforcement does not move significantly during the casting operations.

C. Embedded Items

1. Embedded items shall be positioned at locations specified in the design documents. Inserts, plates, weldments, lifting devices and other items to be imbedded in precast concrete products shall be held rigidly in place so that they do not move significantly during casting operations.

D. Placing Concrete

1. Concrete shall be deposited into forms as near to its final location as practical. The free fall of the concrete shall be kept to a minimum. Concrete shall be consolidated in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Vibrators used to consolidate concrete shall have frequencies and amplitudes sufficient to produce well consolidated concrete.
2. Cold Weather Requirements - Recommendations for cold weather concreting are given in detail in Cold Weather Concreting reported by ACI Committee 306.
 - a. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather.
 - b. All concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact shall be free from frost.
 - c. Frozen materials or materials containing ice shall not be used.
 - d. In cold weather the temperature of concrete at the time of placing shall not be below 45° F. Concrete that freezes before its compressive strength reaches 500 psi shall be discarded.
3. Hot Weather Requirements - Recommendations for hot weather concreting are given in detail in Hot Weather Concreting reported by ACI Committee 305.
 - a. During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing shall not exceed 90° F.

E. Curing

1. Curing by Moisture Retention - Moisture shall be prevented from evaporating from exposed surfaces until adequate strength for stripping (Article 2.6, paragraph F) is reached by one of the following methods:
 - a. Cover with polyethylene sheets a minimum of 6 mils thick.
 - b. Cover with burlap or other absorptive material and keep continually moist.
 - c. Use of a membrane-curing compound applied at a rate not to exceed 200 sq. ft. per gallon, or per manufacturers' recommendations.
2. Surfaces that will be exposed to weather during service shall be cured as above a minimum of 3 days. Forms shall be considered effective in preventing evaporation from the contact surfaces. If air temperature is below 50°F the curing period shall be extended.
3. Curing with Heat and Moisture
 - a. Concrete shall not be subjected to steam or hot air until after the concrete has attained its initial set. Steam, if used, shall be applied within a suitable enclosure, which permits free circulation of the steam. If hot air is used for curing, precautions shall be taken to prevent moisture loss from the concrete. The temperature of the concrete shall not be permitted to exceed 160° F. These requirements do not apply to products cured with steam under pressure in an autoclave.

F. Stripping Products from Forms

1. Products shall not be removed from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal.

G. Shipping Products

1. Products shall not be shipped until they are at least 5 days old, unless it can be shown that the concrete strength has reached at least 75% of the specified 28-day strength, or that damage will not be caused which will impair the performance of the product.

2.06 SOURCE QUALITY CONTROL

- A. Fabricate units in accordance with ACI 318 and the National Precast Concrete Association's Quality Control Manual for Precast Plants.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Site Access

1. General contractor shall be responsible for providing adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete products.

B. Installation

1. Precast concrete products shall be installed to the lines and grades shown in the contract documents or otherwise specified.
2. Products shall be lifted by suitable lifting devices at points provided by the precast concrete producer.
3. Products shall be installed per the precast concrete producer's recommendation.

C. Water tightness

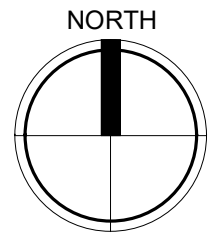
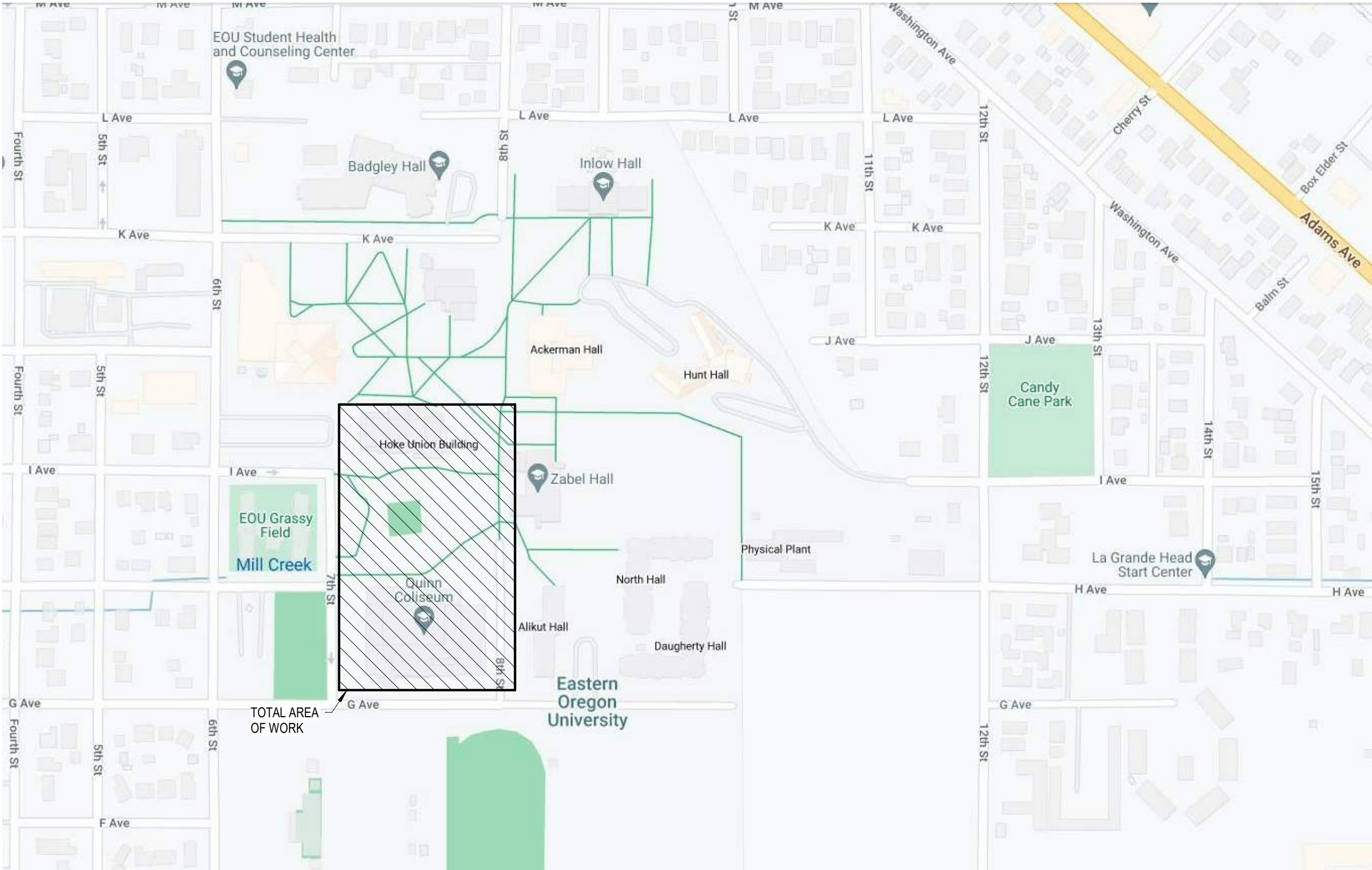
1. Where water tightness is a necessary performance characteristic of the precast concrete product's end use, watertight joints, connectors and inserts should be used to ensure the integrity of the entire system.

3.02 FIELD QUALITY CONTROL

- A. Site tests - when testing is required for an underground product, one of the following methods need to be followed:
1. Vacuum testing prior to backfill according to ASTM C1244.
 2. Water testing according to contract documents and precast concrete producer's recommendations

END OF SECTION

EASTERN OREGON UNIVERSITY DISTRIBUTION MAIN REPLACEMENT EOU WEST STEAM CONTRACT # FP-2022-03 LA GRANDE OREGON



VICINITY MAP

NOT TO SCALE

100% Construction Documents

OWNER:
EASTERN OREGON UNIVERSITY
Facilities & Planning
One University Blvd,
La Grande, OR 97850
p. 541.962.3114
c. 541.805.0807
Contact: John Garlitz, P.E.
Director of Facilities & Planning
jgarlitz@eou.edu

CIVIL & STRUCTURAL:
ASHLEY & VANCE ENGINEERING
33 NW Franklin Ave. Suite #110
Bend, OR 97703
p. 541.647.1445 x 136
Contact: Davis Keeney
Structural & Civil PM
davis@ashleyvance.com

MECHANICAL & ELECTRICAL:
SYSTEMS WEST ENGINEERS
725 A Street
Springfield, OR 97477
p. 541.342.7210
c. 415.323.8934
systemswestengineers.com
Contact: Nate Jenkins, P.E.
SWE Project Manager
njenkins@systemswestengineers.com

SURVEYOR:
BAGETT-GRIFFITH & BLACKMAN
2006 Adams Avenue
La Grande, OR 97850
p. 541.963.6092
Contact: Jeff Hsu
Surveyor
jeff@bgbsurveyors.com

January 23, 2026

SHEET INDEX

G001	COVER SHEET - CONTACTS, VICINITY MAP, SITE MAP & SHEET INDEX
C001	NOTES SHEET
C101	EXISTING CONDITIONS, DEMOLITION AND EROSION CONTROL PLAN
C201	CIVIL SITE PLAN
C301	PLAN AND PROFILE SHEET (STA 1+00 - 5+00)
C302	PLAN AND PROFILE SHEET (STA 5+00 - 9+87)
C401	DETAIL SHEET
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M099	SITE PLAN
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E121	FLOOR PLAN - QUINN BASEMENT
E122	FLOOR PLANS - QUINN AND HOKE FIRST FLOOR



EOU WEST STEAM

DISTRIBUTION
MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

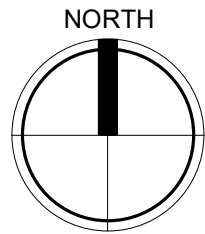
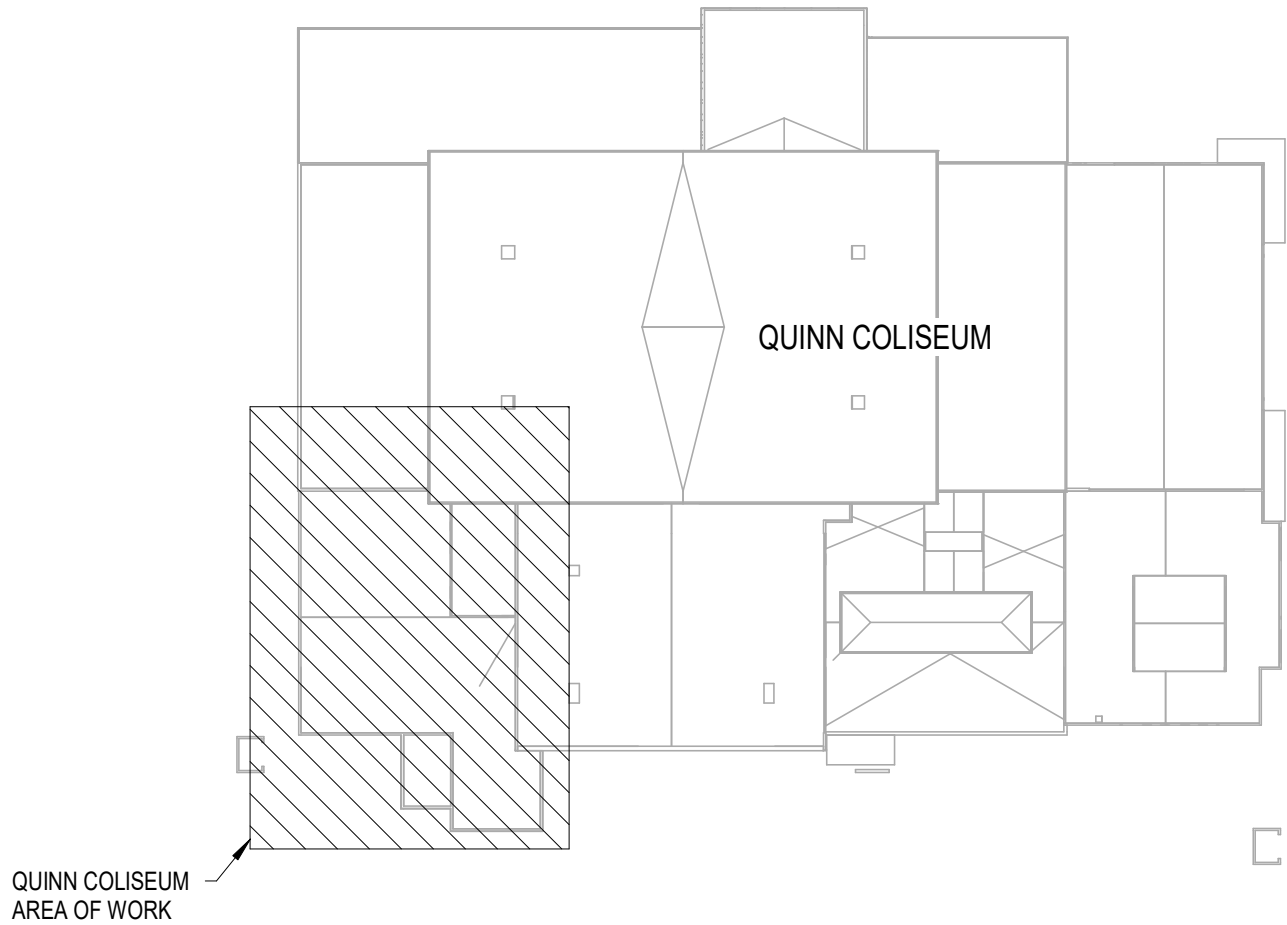
COVER SHEET -
CONTACTS,
VICINITY MAP,
SITE MAP &
SHEET INDEX

MARK	DATE	DESCRIPTION

DESIGNED: MLO
DRAWN: JSH
CHECKED: GNL

DATE: 01.23.2026
PROJECT: Y006.03

G001



KEY PLAN

NOT TO SCALE

GENERAL NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF LA GRANDE AND THE CURRENT EDITION OF THE OREGON STATE BUILDING CODE.
- IN THE EVENT OF A CONFLICT BETWEEN ANY REFERENCED STANDARD, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.
- STORMWATER POLLUTION PREVENTION REQUIREMENTS PER CITY OF LA GRANDE.
- A COPY OF THESE APPROVED PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
- BEFORE BEGINNING WORK, CONTRACTOR SHALL CONFIRM WITH AGENCIES HAVING JURISDICTION THAT ALL REQUIRED PERMITS AND LICENSES HAVE BEEN OBTAINED AND ALL REQUIRED NOTICES GIVEN.
- UNDERGROUND AND OVERHEAD CONSTRUCTION IN ADDITION TO WHAT IS SHOWN ON THESE PLANS MAY BE PART OF THIS PROJECT, INCLUDING ARCHITECTURAL AND LANDSCAPE ARCHITECTURAL IMPROVEMENTS. ADDITIONAL PERMITS MAY BE REQUIRED.

A. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WORK AND INTERFACING IMPROVEMENTS WITH WORK BY OTHER CONTRACTORS AT THIS JOB SITE AND WITH IMPROVEMENTS REQUIRED BY PLANS BY OTHERS.

B. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS FOR BUILDING AND SITE LAYOUT DIMENSIONING.

C. CONTRACTOR SHALL REFER TO ARCHITECTURAL AND LANDSCAPE ARCHITECTURAL PLANS AND SPECIFICATIONS FOR SITE DEVELOPMENT CONSTRUCTION DETAILS AND DIMENSIONING, INCLUDING THOSE FOR BUILDINGS, PATIOS, WALKWAYS, DRIVEWAYS, WALLS/FENCES, PLUMBING, ELECTRICAL, UTILITIES, LANDSCAPING, AND IRRIGATION.
- ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH APPLICABLE HEALTH AND SAFETY LAWS, ORDINANCES, REGULATIONS, RULES, AND STANDARDS INCLUDING ALL REQUIREMENTS OF OREGON OSHA AND OSHA.
- ALL UNSUITABLE CONSTRUCTION MATERIALS AND RUBBISH AND DEBRIS SHALL BE REMOVED FROM THE JOB SITE; TRANSPORTED TO A SUITABLE LOCATION, AND DISPOSED OF IN A PROPER AND LEGAL MANNER.
- BEFORE COMMENCING EXCAVATION, CONTRACTOR SHALL CONTACT PUBLIC WORKS AND UTILITY COMPANIES OR OTHER OWNERS OF SUBSURFACE FACILITIES WITHIN THE WORK SITE AND SHALL VERIFY WHETHER OR NOT A REPRESENTATIVE WILL BE PRESENT BEFORE AND/OR DURING EXCAVATION, AND SHALL DETERMINE SITE SPECIFIC REQUIREMENTS FOR EXCAVATION.
- CONTRACTOR SHALL NOTIFY PUBLIC WORKS, BUILDING AND SAFETY, UTILITY COMPANIES, AND ENGINEER OF RECORD, AT LEAST 48 HOURS BEFORE START OF ANY CONSTRUCTION AND OF THE TIME AND LOCATION OF PRE-CONSTRUCTION CONFERENCE, AND SHALL DETERMINE FROM EACH PARTY THEIR SCOPE OF WORK TO BE OBSERVED AND BY WHOM, AND SCOPE OF TESTING. DURING THE COURSE OF WORK, CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR OBSERVATION AND TESTING AS STIPULATED PURSUANT TO ABOVE DETERMINATIONS. WORK NOT OBSERVED AND TESTED WILL BE SUBJECT TO REJECTION.
- CONTRACTOR SHALL FURNISH, INSTALL, AND MAINTAIN SUCH SHEETING, SHORING, BRACING, AND/OR OTHER PROTECTION AS IS NECESSARY TO PREVENT FAILURE OF TEMPORARY EXCAVATIONS AND EMBANKMENTS AND TO PREVENT DAMAGE TO EXISTING IMPROVEMENTS, TEMPORARY IMPROVEMENTS, AND PARTIALLY COMPLETED PORTIONS OF THE WORK. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE SUFFICIENCY OF SUCH SUPPORTS AND/OR OTHER PROTECTION PER ALL REQUIREMENTS OF OREGON OSHA AND OSHA.
- CONTRACTOR SHALL PROMPTLY NOTIFY ENGINEER OF RECORD AND AUTHORITY HAVING JURISDICTION BY TELEPHONE AND IN WRITING UPON DISCOVERY OF, AND BEFORE DISTURBING ANY PHYSICAL CONDITIONS DIFFERING FROM THOSE REPRESENTED BY APPROVED PLANS AND SPECIFICATIONS.
- CONTRACTOR SHALL MAINTAIN A COMPLETE AND ACCURATE RECORD OF ALL CHANGES OF CONSTRUCTION FROM THAT SHOWN ON THESE PLANS AND SPECIFICATIONS FOR THE PURPOSE OF PROVIDING A BASIS FOR CONSTRUCTION OF RECORD DRAWINGS. NO CHANGES SHALL BE MADE WITHOUT PRIOR WRITTEN APPROVAL OF ENGINEER OF RECORD AND AUTHORITY HAVING JURISDICTION. UPON COMPLETION OF THE PROJECT, CONTRACTOR SHALL DELIVER THIS RECORD OF ALL CONSTRUCTION CHANGES TO ENGINEER ALONG WITH A LETTER WHICH DECLARES THAT, OTHER THAN THESE NOTED CHANGES, "THE PROJECT WAS CONSTRUCTED IN CONFORMANCE WITH THE APPROVED PLANS AND SPECIFICATIONS."

WARNING: ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THESE PLANS MUST BE APPROVED IN WRITING BY PREPARER.
- CONTRACTOR AGREES THAT, IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONALS HARMLESS FROM ALL LIABILITY AND CLAIMS, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT AND ACCEPTS LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONALS.
- CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR VEHICULAR AND PEDESTRIAN TRAFFIC CONTROL AND SAFETY AND SHALL FURNISH, INSTALL, AND MAINTAIN SUCH FENCING, SIGNS, LIGHTS, TRENCH PLATES, BARRICADES, AND/OR OTHER PROTECTION AS IS NECESSARY FOR SAID CONTROL AND SAFETY.
- CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR PROTECTION OF PUBLIC AND PRIVATE PROPERTY AT OR IN THE VICINITY OF THE JOB SITE AND FURTHER AGREES TO, AT CONTRACTOR'S EXPENSE, REPAIR OR REPLACE TO ORIGINAL CONDITION, ALL EXISTING IMPROVEMENTS WITHIN OR IN THE VICINITY OF THE JOB SITE WHICH ARE NOT DESIGNATED FOR REMOVAL AND WHICH ARE DAMAGED OR REMOVED AS A RESULT OF CONTRACTOR'S OPERATIONS.
- IF A GEOTECHNICAL REPORT HAS BEEN PROVIDED BY ASHLEY AND VANCE ENGINEERING OR ANY OTHER CONSULTANT, CONTRACTOR TO FOLLOW RECOMMENDATIONS IN THE GEOTECHNICAL REPORT. IF THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT ARE IN CONFLICT WITH THESE PLANS, CONTRACTOR TO NOTIFY THE PROJECT ENGINEER BEFORE CONSTRUCTING AFFECTED COMPONENTS. CONTRACTOR TO IDENTIFY POTENTIAL GEOTECHNICAL ISSUES AND CONSULT A GEOTECHNICAL ENGINEER AS NEEDED.

GENERAL GRADING NOTES:

- GRADING SHALL BE IN CONFORMANCE WITH RECOMMENDATIONS MADE BY THE GEOTECHNICAL ENGINEER DURING OBSERVATION AND TESTING OF SITE DEMOLITION, PREPARATION, GRADING, AND DEVELOPMENT WORK. FOR ANY CONFLICT BETWEEN THESE PLANS AND THE RECOMMENDATIONS AND/OR SPECIFICATIONS OF THE GEOTECHNICAL ENGINEER, THE MORE STRINGENT PROVISION SHALL GOVERN.
- AREAS TO BE GRADED SHALL BE CLEARED OF ALL VEGETATION (EXCEPT TREES INDICATED TO REMAIN), INCLUDING ROOTS AND ROOT STRUCTURES, OTHER ORGANIC MATERIAL, DEBRIS, NON-COMPLYING FILL, AND OTHER MATERIAL UNSUITABLE FOR SUPPORT OF FILL AND/OR PROPOSED IMPROVEMENTS, AS RECOMMENDED BY AND UNDER THE OBSERVATION AND TESTING OF THE GEOTECHNICAL ENGINEER. CALL THE INSPECTOR FOR INITIAL INSPECTION.
- ALL UNSUITABLE SOIL MATERIALS AND RUBBISH AND DEBRIS RESULTING FROM DEMOLITION AND GRADING OPERATIONS SHALL BE REMOVED FROM THE JOB SITE; TRANSPORTED TO A SUITABLE LOCATION AND DISPOSED OF IN A PROPER AND LEGAL MANNER.
- AREAS TO RECEIVE FILL MATERIAL AND AREAS TO RECEIVE BUILDINGS, EXTERIOR SLABS, WALKWAYS, WALLS, PAVEMENT AND OTHER STRUCTURAL IMPROVEMENTS SHALL BE PREPARED AS RECOMMENDED BY AND UNDER THE OBSERVATION AND TESTING OF THE GEOTECHNICAL ENGINEER. RECOMMENDATIONS FOR OVER EXCAVATION, ADDITIONAL SCARIFICATION, BACKFILL, AND RECOMPACTION ARE CONTAINED IN THE PROJECT GEOTECHNICAL REPORT REFERENCED IN THE GENERAL NOTES ON THESE PLANS.
- PRIOR TO PLACEMENT OF FILL AND BACKFILL MATERIAL, THE PREPARED AREA SHALL BE INSPECTED AND APPROVED BY THE INSPECTOR. THE GEOTECHNICAL ENGINEER SHALL ALSO OBSERVE THE AREAS TO BE FILLED. ALLOW A MINIMUM 48-HOUR NOTICE. FILL AND BACKFILL PLACED ON THE PREPARED AREA WITHOUT THE REQUIRED OBSERVATION SHALL BE REMOVED.
- ALL FILL MATERIAL, WHETHER EXCAVATED ON-SITE OR IMPORTED FROM OFF-SITE, SHALL BE TESTED AND APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT. IMPORTED FILL MATERIAL SHALL BE EQUAL TO OR BETTER IN QUALITY THAN THE ON-SITE SOILS AND SHALL CONFORM TO THE RECOMMENDATION OF THE GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL TEST AND APPROVE THE SOIL PROPOSED FOR IMPORT FOR STRUCTURAL FILL PRIOR TO IMPORTATION TO THE SITE. THE LANDSCAPE ARCHITECT AND THE GEOTECHNICAL ENGINEER SHALL TEST AND APPROVE THE SOIL PROPOSED FOR IMPORT FOR LANDSCAPE AREA SURFACE MATERIAL PRIOR TO IMPORTATION TO THE SITE.
- CONTRACTOR SHALL REFER TO THE FOLLOWING AS APPLICABLE:

- ARCHITECT'S PLANS FOR ADDITIONAL GRADING REQUIREMENTS IN BUILDING AREAS.

- LANDSCAPE ARCHITECT'S PLANS FOR TREE PRESERVATION REQUIREMENTS AND FOR SUBGRADE ALLOWANCES IN LANDSCAPE AREAS.

- PUBLIC IMPROVEMENT PLANS FOR INTERFACING WITH PUBLIC GRADING, PAVING, STORM DRAINAGE AND UTILITY IMPROVEMENTS.
- WHERE PLANTER AREAS ARE SHOWN ON THE PLANS ADJACENT TO BUILDINGS AND ARE CONTAINED BY WALKS / FLATWORK LESS THAN 8" BELOW BOTTOM OF SILL PLATE OR WHERE ADJACENT FINISH GRADE OUTSIDE A BUILDING IS SHOWN TO BE LESS THAN 8" BELOW BOTTOM OF SILL PLATE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THAT BUILDING PLANS CALL FOR APPROPRIATE DRAINAGE OF OR WAITING FOR CONSTRUCTION AND IS CONSTRUCTED IN ACCORDANCE WITH ALL BUILDING APPLICABLE CODE REQUIREMENTS.
- PLAN ELEVATIONS SHOWN ON SOIL AND LANDSCAPED AREAS ARE FINISH GRADE (FINISH SURFACE) ELEVATIONS INTENDED TO ESTABLISH SURFACE DRAINAGE CONTROL FOR THESE AREAS. DURING GRADING OPERATIONS, THICKNESSES (SUBGRADE ALLOWANCES) SPECIFIED BY LANDSCAPE ARCHITECT FOR TURF, WOOD CHIPS, MULCH, ETC. SHALL BE SUBTRACTED FROM THESE ELEVATIONS TO ESTABLISH FINISH SUBGRADE.
- BEFORE PLACEMENT OF AGGREGATE BASE OR SUBBASE MATERIAL IN PAVEMENT AREAS, THE SUBGRADE SOIL SHALL BE REVIEWED AND TESTED BY THE GEOTECHNICAL ENGINEER. DURING PAVING OPERATIONS, STRUCTURAL SECTION COMPACTION SHALL BE OBSERVED AND TESTED BY THE GEOTECHNICAL ENGINEER.
- QUALITY REVIEW AND REPORTING REQUIREMENTS.

A. GRADING AND IMPROVEMENTS FOUND NOT IN CONFORMANCE WITH APPROVED PLANS AND DESIGN INTENT SHALL BE CORRECTED BY CONTRACTOR AT CONTRACTOR'S EXPENSE. ADDITIONAL SURVEYING TO CONFIRM ELEVATIONS AFTER CORRECTIVE MEASURES SHALL ALSO BE AT CONTRACTOR'S EXPENSE.

REQUIREMENTS FOR VARIOUS SURFACING CONDITIONS ARE AS FOLLOWS:

- DIRT: NOT LESS THAN 2% (1/4" PER FOOT) SLOPE IN DIRECTION OF SURFACE DRAINAGE AND 0.10 FOOT MAXIMUM DEVIATION FROM DESIGN ELEVATION AT ANY LOCATION

- A.C. PAVEMENT: NOT LESS THAN 1% (1/8 INCH PER FOOT) SLOPE IN DIRECTION OF SURFACE DRAINAGE AND 0.04 FOOT MAXIMUM DEVIATION FROM DESIGN ELEVATION AT ANY LOCATION

- CONCRETE: NOT LESS THAN 0.5% (1/16 INCH PER FOOT) SLOPE IN DIRECTION OF SURFACE DRAINAGE AND 0.02 FOOT MAXIMUM DEVIATION FROM DESIGN ELEVATION AT ANY LOCATION UNLESS NOTED OTHERWISE ON PLANS.

TRENCHING AND BACKFILL NOTES:

- ALL TRENCHING, BEDDING AND BACKFILL MATERIAL AND CONSTRUCTION, SHALL BE IN ACCORDANCE WITH THESE PLANS INCLUDING THE PIPE TRENCH DETAIL.
- TRENCH OR STRUCTURE EXCAVATION SUBGRADE SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF BEDDING MATERIAL OR FORMS. WET OR UNSTABLE SOIL ENCOUNTERED IN THE BOTTOM OF THE EXCAVATION AND DEEMED BY THE GEOTECHNICAL ENGINEER TO BE INCAPABLE OF PROPERLY SUPPORTING THE PIPE OR STRUCTURE BEING CONSTRUCTED, SHALL BE REMOVED TO THE DEPTH RECOMMENDED BY THE GEOTECHNICAL ENGINEER AND THE EXCAVATION BACKFILLED TO THE BOTTOM OF THE PIPE OR STRUCTURE GRADE WITH SUITABLE MATERIAL RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
- WATER ENCOUNTERED IN TRENCH OR STRUCTURE EXCAVATION SHALL BE REMOVED BY THE CONTRACTOR TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER TO PROVIDE DRY CONDITIONS DURING CONSTRUCTION OF PIPE OR STRUCTURE.
- BEDDING AND BACKFILL MATERIAL AND COMPACTED DENSITY, SHALL BE TESTED FOR COMPLIANCE WITH APPLICABLE REQUIREMENTS BY THE GEOTECHNICAL ENGINEER.
- BEDDING AND PIPE ZONE BACKFILL MATERIAL, SHALL BE COMPACTED TO NOT LESS THAN 95% OF MAXIMUM DENSITY. TRENCH BACKFILL SHALL BE COMPACTED TO NOT LESS THAN 90% OF MAXIMUM DENSITY. THE UPPER 12" BELOW THE BASE OR SUB-BASE COURSE IN PAVED AND OTHER TRAFFIC AREAS AND BELOW THE CONCRETE OR SAND COURSE IN WALKWAY AREAS SHALL BE COMPACTED TO NOT LESS THAN 95% OF MAXIMUM DENSITY. BACKFILL COMPACTION SHALL BE TESTED FOR COMPLIANCE WITH THESE REQUIREMENTS IN ACCORDANCE WITH ASTM D-1557, LATEST REVISION, AND REPORTED BY THE GEOTECHNICAL ENGINEER.
- CLASS I OR CLASS II (TRENCH) BACKFILL SHALL NOT BE PLACED UNTIL BEDDING AND INITIAL (PIPE ZONE) BACKFILL HAVE BEEN OBSERVED, TESTED AND APPROVED.
- COMPACTION BY FLOODING OR JETTING IS NOT PERMITTED.
- CONTRACTOR SHALL REVIEW THE GEOTECHNICAL REPORT(S), THE PROJECT WORK AREA AND VICINITY, AND SHALL FAMILIARIZE HIMSELF WITH THE WORK AREA CONDITIONS. CONTRACTOR SHALL MAKE HIS OWN DEDUCTIONS AND CONCLUSIONS AS TO HOW EXISTING AND SUB-SURFACE CONDITIONS WILL AFFECT OR BE AFFECTED BY HIS CONSTRUCTION OPERATIONS, INCLUDING THE NATURE OF MATERIALS TO BE EXCAVATED, THE DEGREE OF DIFFICULTY ASSOCIATED WITH MAKING AND MAINTAINING THE REQUIRED EXCAVATIONS, AND THE DEGREE OF DIFFICULTY WHICH MAY ARISE FROM SUBSURFACE CONDITIONS INCLUDING GROUNDWATER, AND SHALL ACCEPT FULL RESPONSIBILITY THEREOF.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT THE INTEGRITY OF EXISTING PAVEMENT ALONG AND BEHIND THE TRENCH SAWCUT LINES DURING CONSTRUCTION. IF THIS PAVEMENT IS BROKEN-OFF OR OTHERWISE DAMAGED BEFORE NEW PAVEMENT IS PLACED, CONTRACTOR SHALL SAWCUT A NEW CONFORM LINE PARALLEL WITH, FULL LENGTH OF, AND SUFFICIENT DISTANCE (1-FOOT MINIMUM) BEHIND ORIGINAL SAWCUT SO AS TO REMOVE DAMAGED PAVEMENT AND / OR IRREGULARITY ALONG THE CONFORM LINE.

DEMOLITION NOTES:

- THE EXISTENCE AND APPROXIMATE LOCATIONS OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY THE AVAILABLE RECORDS PROVIDED. THE CIVIL ENGINEER ASSUMES NO LIABILITY AS TO THE EXACT LOCATION OF SAID LINES, NOR FOR UTILITY OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY COMPANIES PRIOR TO WORK OR POTHOLE TO DETERMINE THE EXACT LOCATIONS OF ALL LINES AFFECTING THIS WORK. WHETHER OR NOT SHOWN HEREON, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO OR PROTECTION OF ALL EXISTING UTILITY LINES.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DEMOLITION OF THE SITE AND SHALL REMOVE AND DISPOSE OF ALL STRUCTURES ABOVE AND OR BELOW GROUND UNLESS NOTED OTHERWISE. ANY HAZARDOUS MATERIALS ENCOUNTERED SHALL BE HANDLED AND REMOVED AS REQUIRED BY LOCAL AND/OR STATE LAWS AT NO COST TO THE OWNER.
- THE CONTRACTOR SHALL EXERCISE DUE CARE TO AVOID DAMAGE TO EXISTING HARDSCAPE IMPROVEMENTS, UTILITY FACILITIES, AND LANDSCAPING FEATURES THAT ARE NOT AFFECTED BY THESE PLANS.
- ALL JOIN LINES SHALL BE SAWCUT ON A NEAT, STRAIGHT LINE PARALLEL WITH THE JOIN. THE CUT EDGE SHALL BE PROTECTED FROM CRUSHING, AND ALL BROKEN EDGES SHALL BE RE-CUT PRIOR TO JOINING.
- ALL EXISTING OBJECTIONABLE MATERIALS THAT CONFLICT WITH PROPOSED IMPROVEMENTS INCLUDING, BUT NOT LIMITED TO, BUILDING FOUNDATIONS, UTILITIES, APPURTENANCES, TREES, SIGNS, STRUCTURES, ETC. SHALL BE REMOVED AND DISPOSED BY THE CONTRACTOR AT NO COST TO THE OWNER, UNLESS NOTED OTHERWISE HEREIN, OR AS DIRECTED BY THE CONSTRUCTION MANAGER.
- THE CONTRACTOR SHALL PROTECT ALL EXISTING STREETS FROM DAMAGES CAUSED BY HIS OPERATIONS. ANY CURBS DAMAGED DURING HIS OPERATIONS SHALL BE SAWCUT AND REPLACED AT NO COST TO THE OWNER. ANY EXISTING PAVING IDENTIFIED AS POTENTIALLY NEEDING TO BE REPLACED SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE PRIOR TO THE COMMENCEMENT OF WORK.
- THE CONTRACTOR SHALL PERFORM AND BE RESPONSIBLE FOR ALL CLEARING AND GRUBBING OPERATIONS AS NECESSARY TO COMPLETE THE WORK, INCLUDING TRANSPORTATION AND DISPOSAL OF ALL REMOVED MATERIALS, AND ALL ASSOCIATED COSTS.

UTILITY PURVEYORS

ELECTRICITY:	OREGON TRAIL ELECTRIC COOPERATIVE 2408 COVE AVE LA GRANDE, OR 97850 (541) 523-3816
SEWER:	CITY OF LA GRANDE UTILITY DEPARTMENT 1000 ADAMS AVE LA GRANDE, OR 97850 (541) 962-1313
WATER:	CITY OF LA GRANDE UTILITY DEPARTMENT 1000 ADAMS AVE LA GRANDE, OR 97850 (541) 962-1313
NATURAL GAS:	AVISTA LA GRANDE 1411 E. MISSION AVE SPOKANE, WA 99252-0001 (877) 427-8326

SHEET INDEX

SHEET	SHEET TITLE
C001	NOTES SHEET
C101	EXISTING CONDITIONS, DEMOLITION AND EROSION CONTROL PLAN
C201	CIVIL SITE PLAN
C301	PLAN AND PROFILE SHEET (STA 1+00 - 5+00)
C302	PLAN AND PROFILE SHEET (STA 5+00 - 9+87)
C401	DETAIL SHEET

STANDARD ABBREVIATIONS

(E)	EXISTING	EG	EXISTING GRADE	P/L	PROPERTY LINE
(P)	PROPOSED	EP	EDGE OF PAVEMENT	POC	POINT OF CONNECTION
AC	ASPHALTIC CONCRETE	EVC	END VERTICAL CURVE	PS	PARKING STRIPE
BLDG	BUILDING	FFE	FINISHED FLOOR ELEVAITON	PVC	POLYVINYL CHLORIDE
BCR	BEGIN CURB RETURN	FG	FINISHED GRADE	RW	RIGHT OF WAY
BS	BOTTOM OF STEP	FH	FIRE HYDRANT	SD	STORM DRAIN
BVC	BEGIN VERTICAL CURVE	FL	FLOW LINE	SG	SUB-GRADE ELEVATION
BW	BOTTOM OF WALL	FS	FINISHED SURFACE	SS	SANITARY SEWER
CB	CATCH BASIN	GB	GRADE BREAK	TC	TOP OF CURB, CONCRETE
C/L	CENTERLINE	IE	INVERT ELEVATION	TF	TOP OF FOOTING
CMU	CONCRETE MASONRY UNIT	INV	INVERT	TG	TOP OF GRATE
CONC	CONCRETE	LA	LANDSCAPE AREA	TS	TOP OF STEP
DW	DRIVEWAY	NG	NATURAL GRADE	TW	TOP OF WALL
ECR	END CURB RETURN	PA	PLANTER AREA	VC	VERTICAL CURVE
		PCC	PORTLAND CEMENT CONCRETE		

USE OF PLANS:

THIS DRAWING IS PROVIDED IN AN ELECTRONIC FORMAT AS A COURTESY, IF REQUESTED BY THE USER. THE DELIVERY OF THE ELECTRONIC FILE DOES NOT CONSTITUTE THE DELIVERY OF OUR PROFESSIONAL WORK PRODUCT. THE SIGNED HARD COPY PREPARED FOR THE PROJECT CONSTITUTES OUR PROFESSIONAL WORK PRODUCT AND THE HARD COPY MUST BE REFERRED TO FOR THE CORRECT DESIGN INFORMATION. THESE PLANS HAVE BEEN PREPARED SOLELY FOR USE FOR THE PROJECT SCOPE AND SITE SPECIFICALLY IDENTIFIED HEREON AT THE TIME THESE PLANS ARE SIGNED. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, USE OF ANY PART OF THESE PLANS, INCLUDING ANY NOTE OR DETAIL, FOR ANY UNAPPROVED OR REVISED PROJECT SCOPE, OR FOR ANY OTHER PROJECT AT THIS OR ANY OTHER SITE. USER AGREES TO INDEMNIFY AND HOLD HARMLESS ASHLEY & VANCE FOR ALL COSTS AND DAMAGES IF USED.

USE OF ELECTRONIC INFORMATION:

ELECTRONIC INFORMATION MAY BE PROVIDED BY THE ENGINEER FOR CONVENIENCE. UNDER NO CIRCUMSTANCES SHALL DELIVERY OF ELECTRONIC FILES FOR USE BY OTHERS BE DEEMED A SALE BY THE ENGINEER AND THE ENGINEER MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT SHALL THE ENGINEER BE LIABLE FOR INDIRECT OR CONSEQUENTIAL DAMAGES AS A RESULT OF THE USE OR REUSE OF THE ELECTRONIC FILES BY OTHERS.

ELECTRONIC INFORMATION IS INTENDED TO PROVIDE INFORMATION SUPPLEMENTAL AND SUBORDINATE TO THE CONSTRUCTION CONTRACT DOCUMENTS. LAYOUT AND CONSTRUCTION OF PROJECT ELEMENTS SHALL BE BASED ON DIMENSIONS AND INFORMATION INCLUDED ON THE SIGNED AND SEALED CONSTRUCTION CONTRACT DOCUMENTS WHICH SHALL CONTROL OVER ELECTRONIC INFORMATION. USER IS RESPONSIBLE FOR CONFIRMING LOCATION OF PROPOSED IMPROVEMENTS BASED ON DIMENSIONS AND INFORMATION INCLUDED ON THE CONSTRUCTION CONTRACT DOCUMENTS; INCONSISTENCIES BETWEEN THE ELECTRONIC INFORMATION AND THE CONSTRUCTION CONTRACT DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION PRIOR TO CONSTRUCTION.

PROJECT ELEMENTS SUCH AS MANHOLES, CATCH BASINS, UTILITY VAULTS, VALVE ASSEMBLIES, STAIRS, RAMPS, WALLS, ETC. ARE SHOWN SCHEMATICALLY IN THE ELECTRONIC INFORMATION AND CONSTRUCTION OF THESE ELEMENTS SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION NOTES AND DETAILS PRESENTED OR REFERENCED IN THE SIGNED AND SEALED CONSTRUCTION CONTACT DOCUMENTS. IMPROVEMENTS CONSTRUCTED BASED ON ELECTRONIC INFORMATION AND IN CONFLICT WITH THE DRAWING DIMENSIONS DETAILS, AND THE CONSTRUCTION CONTRACT DOCUMENTS SHALL BE REMOVED AND CONSTRUCTED IN THE PROPER LOCATION AND DIMENSIONS AT CONTRACTOR'S SOLE EXPENSE.

DIGITAL DRAWINGS ARE TYPICALLY A COMPILATION OF DRAWINGS FROM A NUMBER OF SOURCES AND, AS SUCH, THERE IS INFORMATION IN THE ELECTRONIC FILE ISSUED BY THE ENGINEER THAT WAS NOT DEVELOPED BY THE ENGINEER AND IS NOT AUTHORIZED BY THE ENGINEER FOR USE BY OTHERS. ELECTRONIC INFORMATION PROVIDED BY THE ENGINEER SHALL ONLY BE APPLICABLE FOR IMPROVEMENTS DESIGNED BY THE ENGINEER AND WHICH ARE SPECIFICALLY DESIGNATED BY CONSTRUCTION NOTES AND/OR DETAILS ON THE SIGNED AND SEALED CONTRACT DOCUMENTS.

IF DIGITAL FILES ARE OBTAINED WITH THE INTENT TO USE THEM FOR PROJECT STAKING, THEY SHALL ONLY BE USED BY A QUALIFIED ENGINEER OR LAND SURVEYOR. DIGITAL INFORMATION SHALL ONLY BE USED FOR STAKING HORIZONTAL LOCATION OF PROPOSED IMPROVEMENTS AFTER IT HAS BEEN CONFIRMED WITH THE SIGNED AND SEALED CONSTRUCTION CONTRACT DOCUMENTS.

THE DIGITAL DRAWINGS ARE NOT INTENDED TO BE USED DIRECTLY FOR CONTROL OF CONTRACTOR'S GRADING OPERATIONS WITHOUT STAKING BY ENGINEER OR LAND SURVEYOR. THE INTERSECTION OF PROPOSED CUT AND FILL SLOPES WITH EXISTING GRADE IS APPROXIMATE WHERE SHOWN ON THE DRAWINGS AND SHALL BE STAKED BY FIELD STAKING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONSTRUCT SLOPES IN CONFORMANCE WITH THE SPECIFIED AND DETAILED REQUIREMENTS CONTAINED IN THE CONTRACT DOCUMENTS.

SURVEY NOTES

EXISTING TOPOGRAPHIC AND BOUNDARY INFORMATION SHOWN HEREON PER SURVEY BY BAGETT, GRIFFITH AND BLACKMAN DATED 2022.10.26

HORIZONTAL DATUM: NAD-83(2011)

VERTICAL DATUM: NAVD-88

BENCHMARK: 22964.88 N, 15821.35 E, BRASS SCREW WITH WASHER MARKED OPLS 83571, 2802.42 Z

SURVEY MONUMENT PROTECTION:

PROTECT AND PRESERVE, IN PLACE, ALL SURVEY MONUMENTS AND BENCHMARKS. DO NOT DISTURB, MOVE, OR RELOCATE MONUMENTS OR BENCHMARKS WITHOUT THE PRIOR REVIEW AND APPROVAL BY THE AGENCY HAVING JURISDICTION OVER THE MONUMENT OR BENCHMARK. THE CONTRACTOR SHALL CONTRACT WITH A LICENSED SURVEYOR FOR MONUMENTS REQUIRING DISTURBANCE OR REMOVAL, AND THE SURVEYOR SHALL RESET THE MONUMENTS OR PROVIDE PERMANENT WITNESS MONUMENTS AND FILE THE REQUIRED DOCUMENTATION WITH THE AUTHORITY HAVING JURISDICTION, PURSUANT TO ALL APPLICABLE BUSINESS AND PROFESSIONAL CODES.

LOCATION:

ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:

EASTERN OREGON
UNIVERSITY

NOTES SHEET

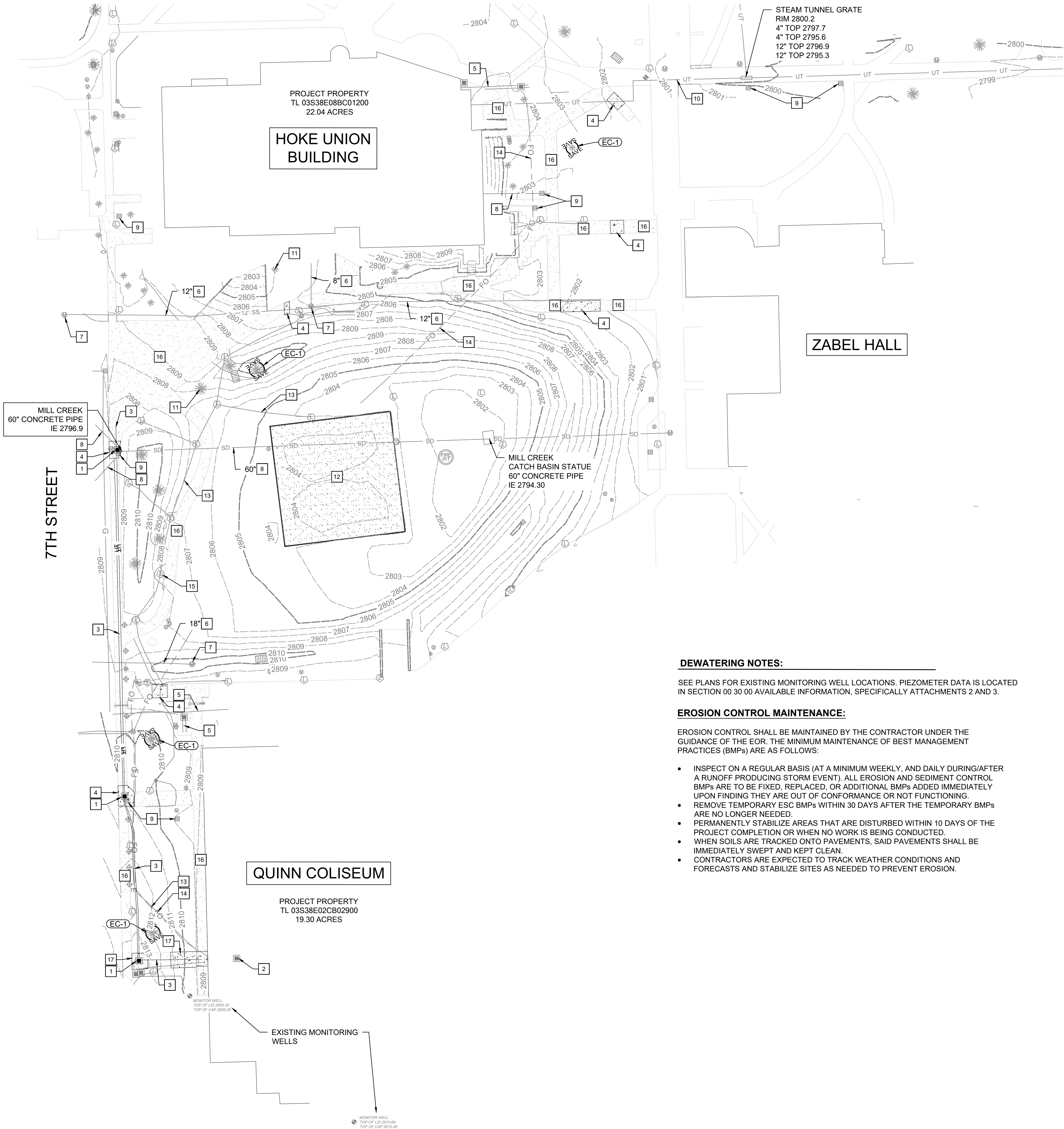
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DRAWN:		MFH
CHECKED:		DMK
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DATE:	01.23.2026	
PROJECT:	Y006.03	

OREGON UTILITY
NOTIFICATION CENTER
(503) 232-1987



ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0001 (ADOPTION OF MODEL RULES) THROUGH 952-001-0100 (RECORD KEEPING REQUIREMENTS). YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER.

C001



GENERAL NOTES:

ALL EXISTING UTILITIES SHOWN ARE BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO POTHOLE ALL POINTS OF CONNECTION AND VERIFY ALL CLEARANCES. MATERIAL DEPTH AND LOCATION SHALL BE IDENTIFIED BY CONTRACTOR. IF THERE ARE ANY DIFFERENCES FROM PLAN WITH ANY OF THESE ITEMS, ENGINEER OF RECORD SHALL BE NOTIFIED IMMEDIATELY.

IRRIGATION AND LANDSCAPING NOTES:

ALL REMOVED OR DAMAGED LANDSCAPING AND IRRIGATION TO BE REPLACED IN KIND. CONTRACTOR TO COORDINATE ANY REQUIRED IRRIGATION REROUTING DUE TO CONSTRUCTION CONFLICTS WITH RPA MIDDLE SCHOOL. ALL REMOVED OR DAMAGED LANDSCAPING TO BE REPLACED PER RPA MIDDLE SCHOOL STANDARDS AND SPECIFICATIONS.

DEMOLITION NOTES

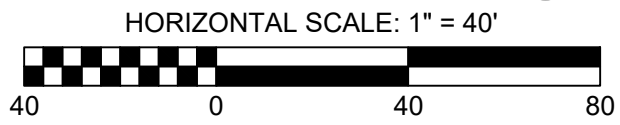
- EXISTING STEAM VAULT AND PIPING TO BE ABANDONED AND VAULT TO BE BACKFILLED PER GEOTECHNICAL RECOMMENDATIONS. PATCH AREA TO MATCH EXISTING SURROUNDING AREAS SURFACE, SECTION DEPTHS AND ELEVATIONS.
- EXISTING STEAM VAULT INSIDE QUINN COLISEUM. SEE MECHANICAL PLANS FOR DETAILS.
- EXISTING STEAM LINE TO BE ABANDONED IN PLACE. SEE MECHANICAL PLANS FOR DETAILS.
- EXISTING CONCRETE TO BE REMOVED AND REPLACED. REMOVE ENTIRE EFFECTED PANEL.
- EXISTING WATER LINE TO REMAIN.
- EXISTING SANITARY SEWER LINE TO REMAIN. SEE PLAN FOR DETAILS.
- EXISTING SANITARY SEWER MANHOLE TO REMAIN.
- EXISTING STORM DRAIN LINE TO REMAIN. SEE PLAN FOR DETAILS.
- EXISTING CATCH BASIN TO REMAIN.
- EXISTING STEAM PIPE AND TUNNEL TO REMAIN.
- EXISTING VEGETATION TO REMAIN. (TYP.)
- EXISTING SAND VOLLEYBALL COURT TO REMAIN.
- EXISTING UNDERGROUND POWER TO REMAIN.
- EXISTING FIBER OPTIC LINE TO REMAIN. CONTRACTOR TO PROTECT AND MAINTAIN THE FIBER OPTIC SYSTEM AT ALL TIMES.
- EXISTING LIGHT TO REMAIN. (TYP.)
- EXISTING CONCRETE TO BE REMAIN.
- EXISTING CONCRETE TO BE REMOVED AND REPLACED. CONTRACTOR TO REPAIR SNOW MELT SYSTEM EFFECTED OR DAMAGED BY THE DEMOLITION. CONCRETE TO BE MINIMUM 4" DEPTH. REMOVE ENTIRE EFFECTED PANEL. PROTECT EXISTING SNOW MELT SYSTEM AND ACTIVE UTILITIES IN THE SURROUNDING AREA. SEE MECHANICAL PLANS FOR SNOW MELT SYSTEM DETAILS.

EROSION AND SEDIMENT CONTROL NOTES:

- INSTALL TREE/VEGETATION PROTECTION FENCING PER DETAIL 4, SHEET C401. PROTECTION TO STAY IN PLACE FOR THE ENTIRE DURATION OF CONSTRUCTION.

EXISTING CONDITIONS AND DEMOLITON LEGEND

— W —	W —	EXISTING WATER LINE
— SS —	SS —	EXISTING SANITARY SEWER LINE
— SD —	SD —	EXISTING STORM DRAIN LINE
— G —	G —	EXISTING GAS LINE
— FO —	FO —	EXISTING FIBER OPTIC LINE
— UT —	UT —	EXISTING STEAM PIPE
— UT —	UT —	EXISTING STEAM PIPE TO BE ABANDONED
— SAVE —	SAVE —	EXISTING STEAM PIPE VAULT TO BE ABANDONED
— SAVE —	SAVE —	EXISTING BUILDING
— SAVE —	SAVE —	TREE PROTECTION
— 3690 —	3690 —	MAJOR CONTOUR (5' INTERVAL)
— 3691 —	3691 —	MINOR CONTOUR (1' INTERVAL)
— * —	* —	EXISTING VEGETATION TO REMAIN
— —	—	EXISTING CONCRETE
— —	—	EXISTING CONCRETE TO BE REMOVED
— —	—	EXISTING VOLLEYBALL COURT
— —	—	LIGHTPOST
— —	—	MANHOLE
— —	—	CLEANOUT
— —	—	CATCH BASIN





**SYSTEMS WEST
ENGINEERS**
725 A Street
Springfield, OR 97477
541.342.7210
systemswestengineers.com

Plan Prepared By:



**Ashley & Vance
ENGINEERING, INC.**
CIVIL & STRUCTURAL



EOU WEST STEAM

**DISTRIBUTION
MAIN
REPLACEMENT**

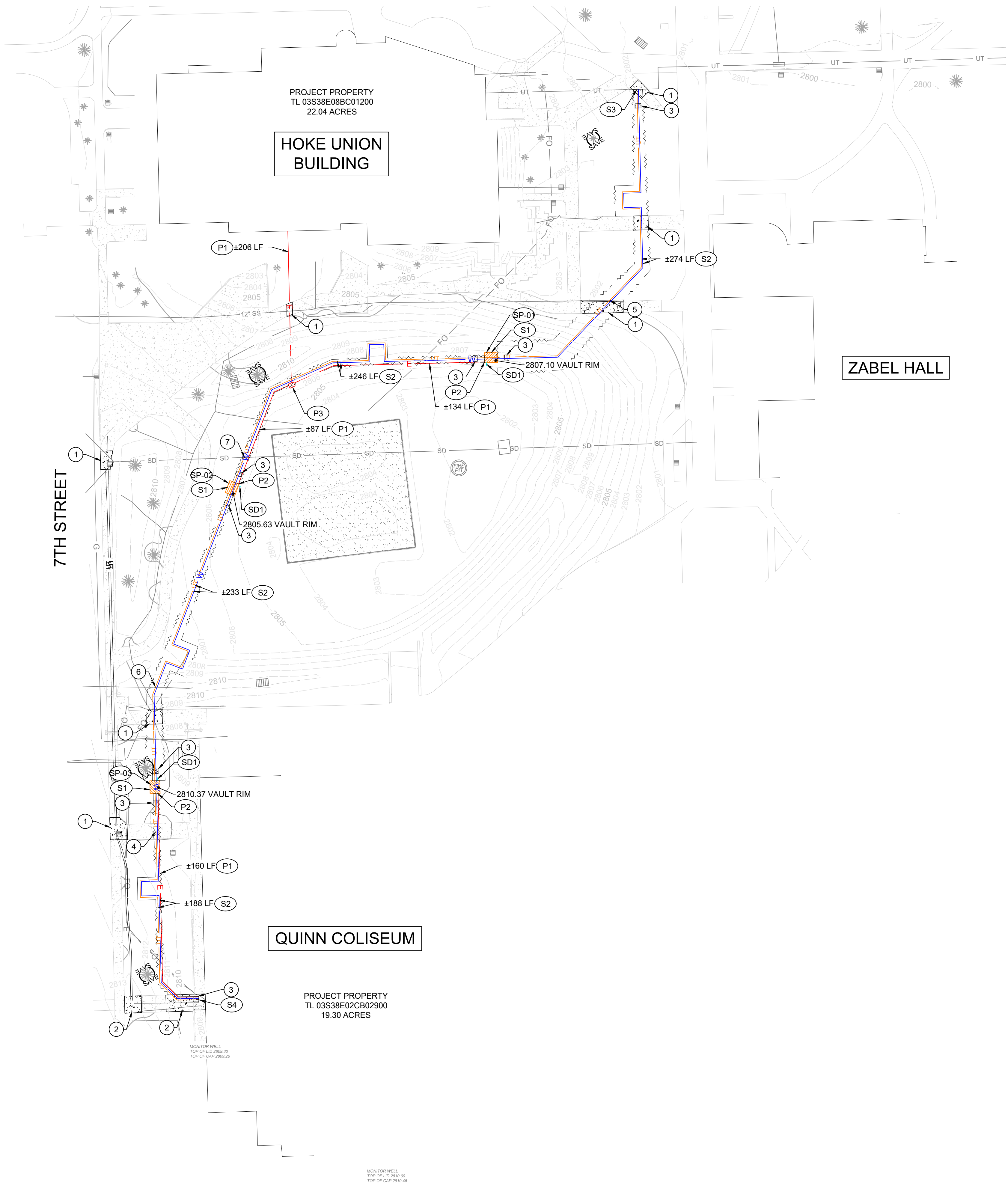
LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

**EXISTING
CONDITIONS,
DEMOLITION AND
EROSION CONTROL
PLAN**

MARK	DATE	DESCRIPTION
■		
DESIGNED:	MFH	
DRAWN:	MFH	
CHECKED:	DMK	
DATE:	01.23.2026	
PROJECT:	Y006.03	

C101



GENERAL NOTES:

SEE MECHANICAL AND ELECTRICAL PLANS FOR FURTHER DETAILS.

SITE CONSTRUCTION NOTES:

1. INSTALL CONCRETE WALKWAY. MATCH EXISTING SECTIONS AND ELEVATIONS. REPLACE ENTIRE EFFECTED PANEL.
2. INSTALL CONCRETE WALKWAY WITH SNOW MELT SYSTEM. REPAIR ANY DAMAGED SNOW MELT SYSTEM. MATCH EXISTING SECTIONS AND ELEVATIONS. REPLACE ENTIRE EFFECTED PANEL. SEE MECHANICAL PLANS FOR SNOW MELT SYSTEM DETAILS.
3. INSTALL ANCHORAGE SET IN CONCRETE BLOCKS PER DETAIL 6, SHEET C401.
4. CONTRACTOR TO BORE PROPOSED UTILITIES UNDER EXISTING CONCRETE SIDEWALK WITH SNOW MELT SYSTEM. REPAIR ANY DAMAGE TO EXISTING SNOW MELT SYSTEM AND CONCRETE WALK.
5. CONTRACTOR TO POTHOLE EXISTING 12" SANITARY SEWER LINE CROSSING PRIOR TO CONSTRUCTION AND HAVE BGB SURVEY THE TOP OF PIPE AND REPORT ELEVATION TO ENGINEER OF RECORD TO CONFIRM DESIGN ELEVATIONS. INSTALL CONCRETE SADDLE PER OREGON STANDARD DRAWING RD306.
6. CONTRACTOR TO POTHOLE EXISTING 18" SANITARY SEWER LINE CROSSING PRIOR TO CONSTRUCTION AND HAVE BGB SURVEY THE TOP OF PIPE AND REPORT ELEVATION TO ENGINEER OF RECORD TO CONFIRM DESIGN ELEVATIONS. INSTALL CONCRETE SADDLE PER OREGON STANDARD DRAWING RD306.
7. CONTRACTOR TO POTHOLE EXISTING 60" MILL CREEK CROSSING PRIOR TO CONSTRUCTION AND HAVE BGB SURVEY THE TOP OF PIPE AND REPORT ELEVATION TO ENGINEER OF RECORD TO CONFIRM DESIGN ELEVATIONS. INSTALL CONCRETE SADDLE PER OREGON STANDARD DRAWING RD306.

POWER CONSTRUCTION NOTES:

- P1. INSTALL UNDERGROUND POWER SERVICE AND TRENCH. SEE PLAN FOR DETAILS. SEE ELECTRICAL PLANS FOR DETAILS.
- P2. TIE INTO PROPOSED CONCRETE STEAM PIPE VAULT FOR SUMP PUMP. SEE ELECTRICAL PLANS FOR DETAILS.
- P3. INSTALL POWER JUNCTION BOX. SEE ELECTRICAL PLANS FOR DETAILS.

STEAM PIPE CONSTRUCTION NOTES:

- S1. INSTALL CONCRETE VAULT PER DETAIL 2, SHEET C401. CONTRACTOR TO CONFIRM VAULT IS FULLY WATER TIGHT.
- S2. INSTALL DIRECT BURY STEAM PIPE LINE AND CONDENSATE RETURN LINE PER DETAIL 5, SHEET C401. SEE PLAN FOR DETAILS. SEE MECHANICAL PLANS FOR DETAILS.
- S3. TIE PROPOSED DIRECT BURY STEAM PIPE INTO EXISTING STEAM PIPE TUNNEL. SEE MECHANICAL PLANS FOR DETAILS.
- S4. TIE PROPOSED DIRECT BURY STEAM PIPE INTO QUINN COLISEUM. SEE MECHANICAL PLANS FOR DETAILS.

SUMP PUMP CONSTRUCTION NOTES:

- SP-01. INSTALL SUMP PUMP 1 IN CONCRETE VAULT PER DETAIL 1, SHEET C401.
- SP-02. INSTALL SUMP PUMP 2 IN CONCRETE VAULT PER DETAIL 1, SHEET C401.
- SP-03. INSTALL SUMP PUMP 3 IN CONCRETE VAULT PER DETAIL 1, SHEET C401.

STORMWATER CONSTRUCTION NOTES:

- SD1. INSTALL 1.5" PVC STORM DRAIN PIPE DAYLIGHTING ON THE DOWNHILL SIDE AWAY FROM THE VAULT PER DETAIL 3, SHEET C401. COVER EXPOSED 1.5" STORM DRAIN PIPE WITH ROCKS FOR PROTECTION AND TO BLEND IT IN WITH THE SURROUNDING LANDSCAPE.

SITE PLAN LEGEND

UT	UT	PROPOSED STEAM LINE
W	W	PROPOSED CONDENSATE RETURN LINE
UT	UT	EXISTING STEAM LINE TO BE ABANDONED
E		CONCRETE VAULT
		UNDERGROUND POWER
SD	SD	JUNCTION BOX
		STORM DRAIN PIPE
		BUILDING
		CONCRETE SIDEWALK
		EXISTING CONCRETE SIDEWALK
		TRENCH LIMITS

IRRIGATION NOTES:

IRRIGATION SYSTEM LAYOUT ASSUMED BASED ON OWNERS KNOWLEDGE. FIELD VERIFY EXACT LOCATIONS WITH THE OWNER'S REP. PROTECT ALL AREAS OF THE SYSTEM TO REMAIN AS DIRECTED BY THE OWNER, OR OWNER'S REP. REPAIR ANY DAMAGES TO THE SYSTEM DURING CONSTRUCTION. PROTECTION OF THE EXISTING IRRIGATION AND REPAIRS DUE TO CONSTRUCTION ACTIVITIES IS CONSIDERED INCIDENTAL TO THE PROJECT.

EOU WEST STEAM

DISTRIBUTION
MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

CIVIL SITE PLAN

MARK	DATE	DESCRIPTION

DESIGNED:	MFH

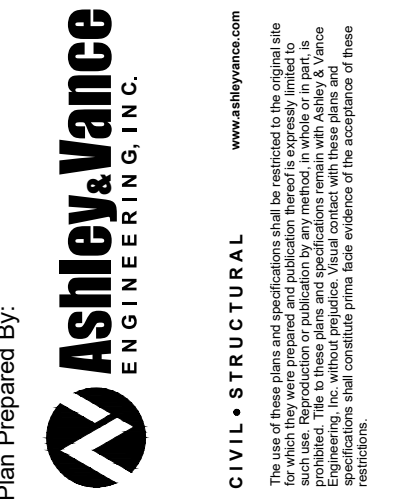
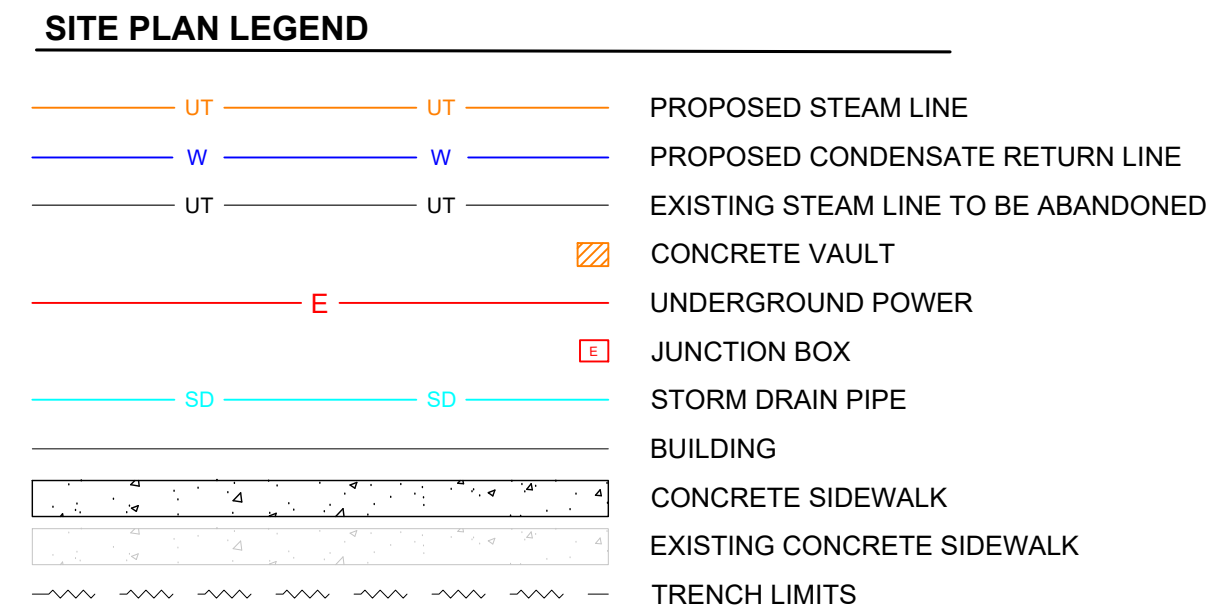
DRAWN:	MFH

CHECKED:	DMK

DATE:	01.23.2026

PROJECT:	Y006.03

C201



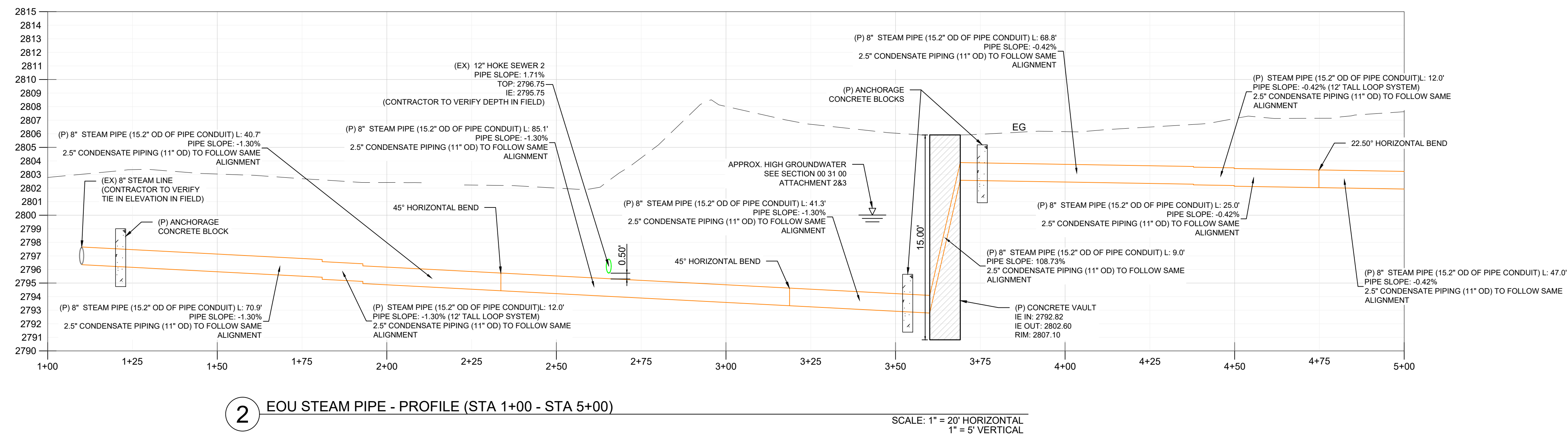
YOU WEST STEAM

DISTRIBUTION
MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
A GRANDE, OR 97850

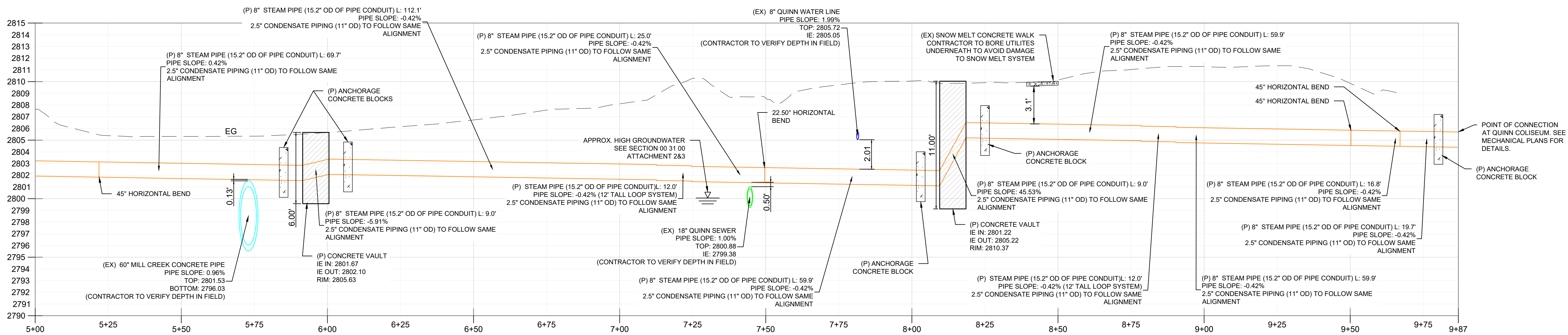
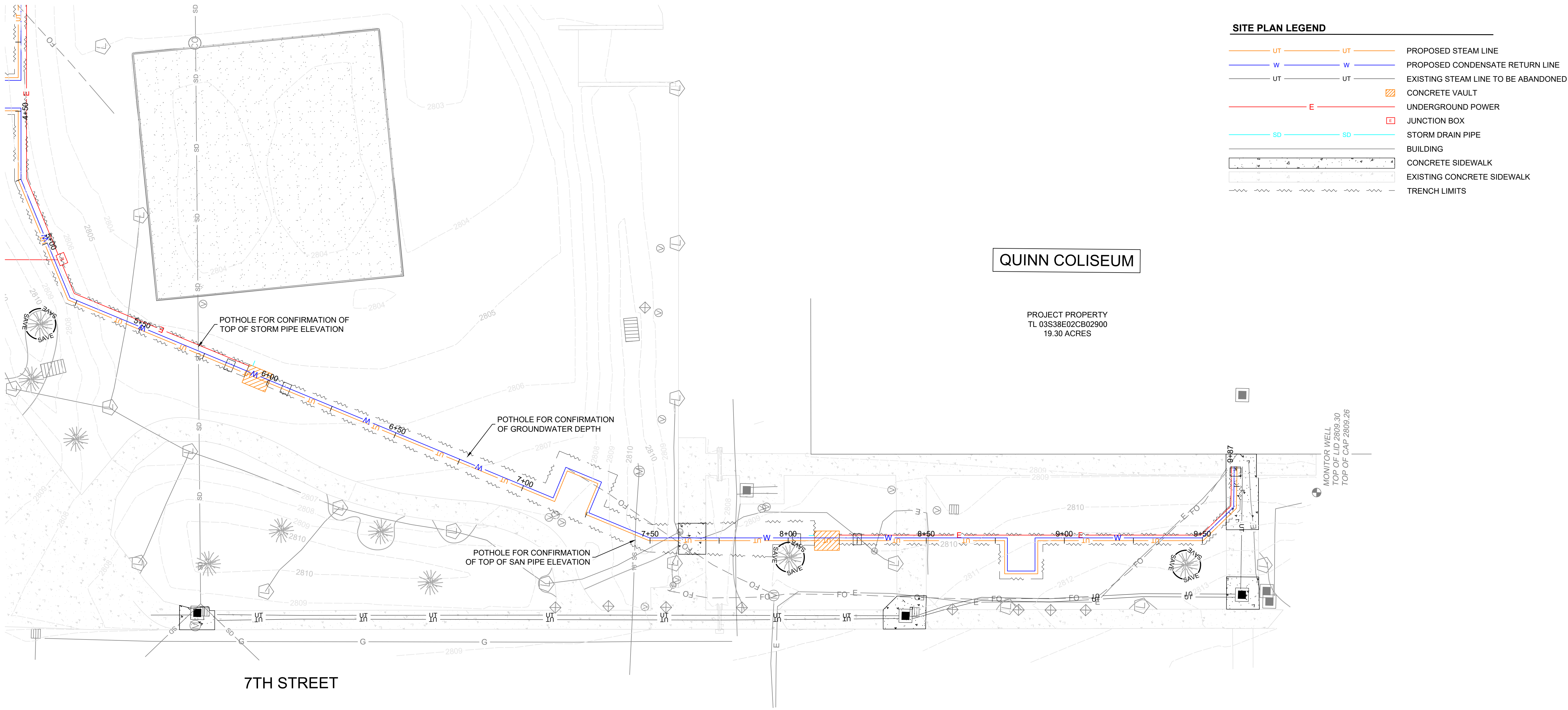
OWNER:
EASTERN OREGON
UNIVERSITY

PLAN AND PROFILE SHEET (STA 1+00 - 5+00)



MARK	DATE	DESCRIPTION
DESIGNED:		MFH
DRAWN:		MFH
CHECKED:		DMK
DATE:	01.23.2026	
PROJECT:	Y006.03	

C301



PLUMBING LEGEND

SYMBOL	ABBREV.	DESCRIPTION
FIRE PROTECTION PIPING:		
	F	FIRE COMMON SUPPLY
PLUMBING PIPING:		
	CW	POTABLE COLD WATER
	IRW	NON-POTABLE COLD WATER (IRRIGATION)
	HW	POTABLE HOT WATER
	HWR	POTABLE HOT WATER RETURN
	V	SANITARY PLUMBING VENT
	W	SANITARY WASTE
	PW	PUMPED SANITARY WASTE
	IW	SANITARY INDIRECT WASTE
FUEL PIPING:		
	G	NATURAL GAS

SYMBOL	ABBREV.	DESCRIPTION
		PIPING UP
		PIPING DOWN
		SLOPE OF PIPE IN DECIMALS OF FEET
		CAPPED PIPE
		DIRECTION OF FLOW
		UNION
		PUMP
	DV	DRAIN VALVE
	BV	BALL VALVE
	BFV	BUTTERFLY VALVE
	CHV	CHECK VALVE
	GV	GATE VALVE
	GBV	GLOBE VALVE
	SV	SOLENOID VALVE
	PRV	PRESSURE REGULATING VALVE
		WYE STRAINER
	RV	RELIEF VALVE
	SSV	STEAM SAFETY VALVE
	TPS	TEMPERATURE/PRESSURE SAFETY VALVE
	BPV	BACK PRESSURE VALVE
	MAV	MANUAL AIR VENT
	AAV	AUTOMATIC AIR VENT
	COTG, FCO	CLEANOUT TO GRADE, FLOOR CLEANOUT
	WCO	WALL CLEANOUT
	FD	FLOOR DRAIN
	HB	HOSE BIBB (DIAGRAM)
	HB	HOSE BIBB (PLAN)
		PENETRATION THROUGH WALL, FLOOR, OR ROOF

SYMBOL	ABBREVIATION	DESCRIPTION
	DIA	DIAMETER
		NEW TO EXISTING POINT OF CONNECTION
		NOTE REFERENCE MARKER
	PLAN OR DETAIL NUMBER	PLAN OR DETAIL REFERENCE MARKER
	SHEET NUMBER	
	SECTION LETTER	SECTION REFERENCE MARKER
	EQUIPMENT TYPE	EQUIPMENT MARKER
	EQUIPMENT NUMBER	
	ROOM NAME	ROOM MARKER
	ROOM NUMBER	
		EXISTING SHOWN LIGHT
		NEW WORK SHOWN BOLD
		EXISTING TO BE REMOVED
		FIRE SPRINKLER ZONE BOUNDARY

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	PROCESS PIPING SIGNAL		EQUIPMENT CONTROL PANEL (W/EQUIP. INDICATED UNDERLINED)
	ELECTRICAL SIGNAL		CP = CONTROL PANEL FAP = FIRE ALARM PANEL MC = MOTOR CONTROLLER VFD = VARIABLE FREQUENCY DRIVE
	ALARM		RELAY DP = DIFFERENTIAL POWER
	BAS INPUT/OUTPUT POINT		
	AI = ANALOG INPUT		
	AO = ANALOG OUTPUT		
	DI = DIGITAL INPUT		
	DO = DIGITAL OUTPUT		
	FUNCTION DESIGNATION		
	S/S = START/STOP		

ABBREVIATIONS			
ABC	ABOVE CEILING	ID	INSIDE DIAMETER
ABS	ACRYLONITRILE BUTADIENE STYRENE	IE	INVERT ELEVATION
AC	AIR COMPRESSOR	IN	INCH, INCHES
ACFM	ACTUAL CUBIC FEET PER MINUTE	IN WC	INCHES WATER COLUMN
ACT	ACOUSTICAL CEILING TILE	IPS	IRON PIPE SIZE
AD	AREA DRAIN	IW	INDIRECT WASTE
ADA	AMERICANS WITH DISABILITY ACT	KW	KILOWATT
AFT	ABOVE FINISHED FLOOR	KWH	KILOWATT-HOUR
AFG	ABOVE FINISHED GRADE	LBS	POUNDS
AFS	AUTOMATIC FIRE SPRINKLER	LAV	LAVATORY
AHJ	AUTHORITY HAVING JURISDICTION	LF	LINEAR FEET
ALT	ALTERNATE	LPG	LIQUIFIED PETROLEUM GAS
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	LWT	LEAVING WATER TEMPERATURE
ARCH	ARCHITECT/ARCHITECTURAL	MAX	MAXIMUM
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING, & AIR-CONDITIONING ENGINEERS	MBH	THOUSAND BTUS PER HOUR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	MCA	MINIMUM CIRCUIT AMPACITY
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS	MECH	MECHANICAL
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERING	MFR	MANUFACTURER
AVTR	ACID VENT THROUGH ROOF	MIN	MINIMUM
AWWA	AMERICAN WATER WORKS ASSOCIATION	MOP	MAXIMUM OVERCURRENT PROTECTION
BAS	BUILDING AUTOMATION SYSTEM	MS	MOTOR STARTER
BFF	BELOW FINISHED FLOOR	NA	NOT APPLICABLE
BFP	BACKFLOW PREVENTER	NC	NORMALLY CLOSED
BLDG	BUILDING	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
BHP	BRAKE HORSEPOWER	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
BOP	BOTTOM OF PIPE	NIC	NOT IN CONTRACT
BTUH	BRITISH THERMAL UNITS PER HOUR	(NL)	NEW LOCATION
CFCI	CONTRACTOR FURNISHED/ CONTRACTOR INSTALLED	NPSH	NET POSITIVE SUCTION HEAD
CFH	CUBIC FEET PER HOUR	NPT	NATIONAL PIPE THREAD
CFM	CUBIC FEET PER MINUTE	NTS	NOT TO SCALE
CFOI	CONTRACTOR FURNISHED/ OWNER INSTALLED	OD	OUTSIDE DIAMETER
CGA	COMPRESSED GAS ASSOCIATION	OFCI	OWNER FURNISHED/ CONTRACTOR INSTALLED
CI	CAST IRON	OFOI	OWNER FURNISHED/ OWNER INSTALLED
CLG	CEILING	OH	OVERHEAD
CMU	CONCRETE MASONRY UNIT	OPSC	OREGON PLUMBING SPECIALTY CODE
CO	CLEANOUT	OSHA	OCCUPATION SAFETY AND HEALTH ADMINISTRATION
CONC	CONCRETE	PD	PRESSURE DROP
CONT	CONTINUATION	PDI	PLUMBING & DRAINAGE INSTITUTE
COTG	CLEANOUT TO GRADE	PE	POLYETHYLENE
CPVC	CHLORINATED POLYVINYL CHLORIDE	PEX	CROSS-LINKED POLYETHYLENE
CR	CONTROL RELAY	PLBG	PLUMBING
(D)	DEMOLISH, DEMOLITION	POC	POINT OF CONNECTION
DBA	DECIBELS ACOUSTIC	PH	PHASE
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY	PP	POLYPROPYLENE
DCV	DOUBLE CHECK VALVE	PPH	POUNDS PER HOUR
DF	DRINKING FOUNTAIN	PPM	PARTS PER MILLION
DFU	DRAINAGE FIXTURE UNIT	PRV	PRESSURE REGULATING VALVE
DIA	DIAMETER	PSI	POUNDS PER SQUARE INCH
DI	DUCTILE IRON	PSIG	POUNDS PER SQUARE INCH GAUGE
DI WATER	DEIONIZED WATER	PTFE	POLYTETRAFLUOROETHYLENE (TEFLON)
DN	DOWN	PVC	POLYVINYL CHLORIDE
DW	DISTILLED WATER	PVDF	POLYVINYLIDENE FLUORIDE
DWG	DRAWING	(R)	RELOCATE
(E)	EXISTING	RD	ROOF DRAIN
ECM	ELECTRONICALLY COMMUTATED MOTOR	REQ'D	REQUIRED
EEM	ENERGY EFFICIENCY MEASURE	RO	REVERSE OSMOSIS
ELEC	ELECTRICAL	RP/RPBP	REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER
EPDM	ETHYLENE PROPYLENE-DIENE MONOMER	RPM	REVOLUTIONS PER MINUTE
EWT	ENTERING WATER TEMPERATURE	SCCR	SHORT CIRCUIT CURRENT RATING
FA	FIRE ALARM	SCFM	STANDARD CUBIC FEET PER MINUTE
FD	FLOOR DRAIN	SCH	SCHEDULE
FDC	FIRE DEPARTMENT CONNECTION	SDR	STANDARD DIMENSIONAL RATIO
FFE	FINISHED FLOOR ELEVATION	SPKR	SPRINKLER
FLA	FULL LOAD AMPS	SQFT	SQUARE FEET
FPM	FEET PER MINUTE	SS	STAINLESS SEEL
FS	FLOOR SINK	TMV	THERMOSTATIC MIXING VALVE
FU	FIXTURE UNIT	TP	TRAP PRIMER
GAL	GALLON	TPA	TRAP PRIMER ARRAY
GALV	GALVANIZED	TSP	TOTAL STATIC PRESSURE
GI	GREASE INTERCEPTOR	TYP	TYPICAL
GPD	GALLONS PER DAY	U	URINAL
GPF	GALLONS PER FLUSH	UG	UNDERGROUND
GPH	GALLONS PER HOUR	UL	UNDERWRITERS LABORATORY
GPM	GALLONS PER MINUTE	UON	UNLESS OTHERWISE NOTED
HDPE	HIGH-DENSITY POLYETHYLENE	UPC	UNIFORM PLUMBING CODE
HOA	HAND-OFF-AUTOMATIC	UV	ULTRAVIOLET
HP	HORSEPOWER	V	VOLTAGE
HVAC	HEATING, VENTILATING, & AIR CONDITIONING	VFD	VARIABLE FREQUENCY DRIVE
HZ	HERTZ	VTR	VENT THROUGH ROOF
IAPMO	INTERNATIONAL ASSOCIATION OF PLUMBING, MECHANICAL OFFICIALS	W	WATT
		WB	WET BULB
		WC	WATER CLOSET
		WG	WATER GAUGE
		WH	WALL HYDRANT
		WHA	WATER HAMMER ARRESTOR
		WSFU	WATER SUPPLY FIXTURE UNITS

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 PIPING AND OTHER MECHANICAL EQUIPMENT IS APPROXIMATE. CONTRACTOR SHALL SITE VERIFY THE LOCATION OF EXISTING PIPING AND EQUIPMENT AND CONSTRUCT WORK FROM FIELD DIMENSIONS. CONTRACTOR SHALL MAKE ADJUSTMENTS NECESSARY TO ACCOMMODATE MINOR DEVIATIONS AT NO COST TO OWNER.
3. FINE (LIGHT) LINE WORK INDICATES EXISTING PIPING AND OTHER MECHANICAL EQUIPMENT. BOLD (HEAVY) LINE WORK INDICATES NEW PIPING AND OTHER MECHANICAL EQUIPMENT.
4. IT IS RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE CUTTING AND PATCHING TO ALLOW THE INSTALLATION OF MATERIALS AND EQUIPMENT AS SPECIFIED AND SHOWN ON DRAWINGS.

DEMOLITION NOTES
1. DEMOLISH EQUIPMENT, FIXTURES, DEVICES, PIPING, CONDUIT, FITTINGS, AND APPURTENANCES INTERIOR TO THE BUILDING THAT ARE MADE OBSOLETE BY THE NEW WORK AND/OR ARE ABANDONED AND NO LONGER IN USE.
2. PROTECT AND MAINTAIN OPERABLE EXISTING EQUIPMENT, FIXTURES, OR SYSTEMS THAT ARE INDICATED TO REMAIN, INCLUDING ELECTRICAL POWER, CONTROLS, AND RELATED SYSTEMS REQUIRED TO MAINTAIN OPERABILITY.
3. EXISTING CONDITIONS SHOWN ARE BASED ON RECORD DOCUMENTS AND LIMITED FIELD OBSERVATIONS OF ACCESSIBLE AREAS AND MAY NOT SHOW THE ENTIRE SCOPE OF DEMOLITION WORK. OMISSION OF EXISTING EQUIPMENT, FIXTURES, DEVICES, PIPING, CONDUIT, FITTINGS, AND APPURTENANCES FROM THE DEMOLITION DRAWINGS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PROVIDE DEMOLITION OF SYSTEMS THAT ARE MADE OBSOLETE BY THE NEW WORK, ARE ABANDONED, OR AS OTHERWISE REQUIRED TO PERFORM THE WORK DESCRIBED HEREIN.
4. PROTECT AND MAINTAIN SERVICES TO REMAIN OPERATIONAL THAT PASS THROUGH THE AREA OF CONSTRUCTION. WHERE IT IS NOT POSSIBLE TO MAINTAIN THESE SERVICES INTACT, REPLACE, REROUTE, MODIFY, OR PROVIDE NEW AS REQUIRED TO MAINTAIN SERVICES.

SHEET LIST - PLUMBING	
P001	LEGEND, GENERAL NOTES, SCHEDULES, & SHEET INDEX
P101	DEMO PLAN - QUINN BASEMENT
P120	FOUNDATION PLAN - QUINN BASEMENT
P121	FLOOR PLAN - QUINN BASEMENT
P501	DETAILS

SANITARY WASTE AND VENT DESIGN CRITERIA

BASIS OF DESIGN: 2023 OREGON PLUMBING SPECIALTY CODE, CHAPTER 7, 'SANITARY DRAINAGE' AND CHAPTER 9, 'VENTS.'
ALL WASTE PIPING SLOPED AT 1/4-INCH/FT. UNLESS OTHERWISE NOTED.
ALL VENT PIPING SLOPED UPWARDS AT 1/8-INCH/FT. UNLESS OTHERWISE NOTED

PLUMBING PUMP

(1) MOTOR CONTROLS FURNISHED BY DIV. 22													
(2) MS: MOTOR STARTER, VFD: VARIABLE FREQUENCY DRIVE, ECM: ECM MOTOR CONTROLLER, CR: CONTROL RELAY, CP: CONTROL PANEL													
TAG	MANUFACTURER	MODEL	SERVICE	TYPE	FLOW (GPM)	TOTAL HEAD (FT)	VOLTS	PHASE	RPM	HP	MOTOR CONTROL (1) (2)	REMARKS	
SE-01	WEIL	2103	WASTEWATER	DUPLEX	89	22	208	3	1750	1.5	CP	REPLACES (E) SEWAGE EJECTOR IN POOL BASEMENT MECH ROOM	



EOU WEST STEAM

DISTRIBUTION MAIN REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON UNIVERSITY

LEGEND, GENERAL NOTES, SCHEDULES, & SHEET INDEX

MARK	DATE	DESCRIPTION

DESIGNED: EML

DRAWN: EML

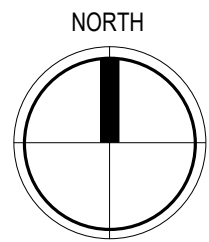
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DATE: 01.23.2026

PROJECT: Y006.03

P001

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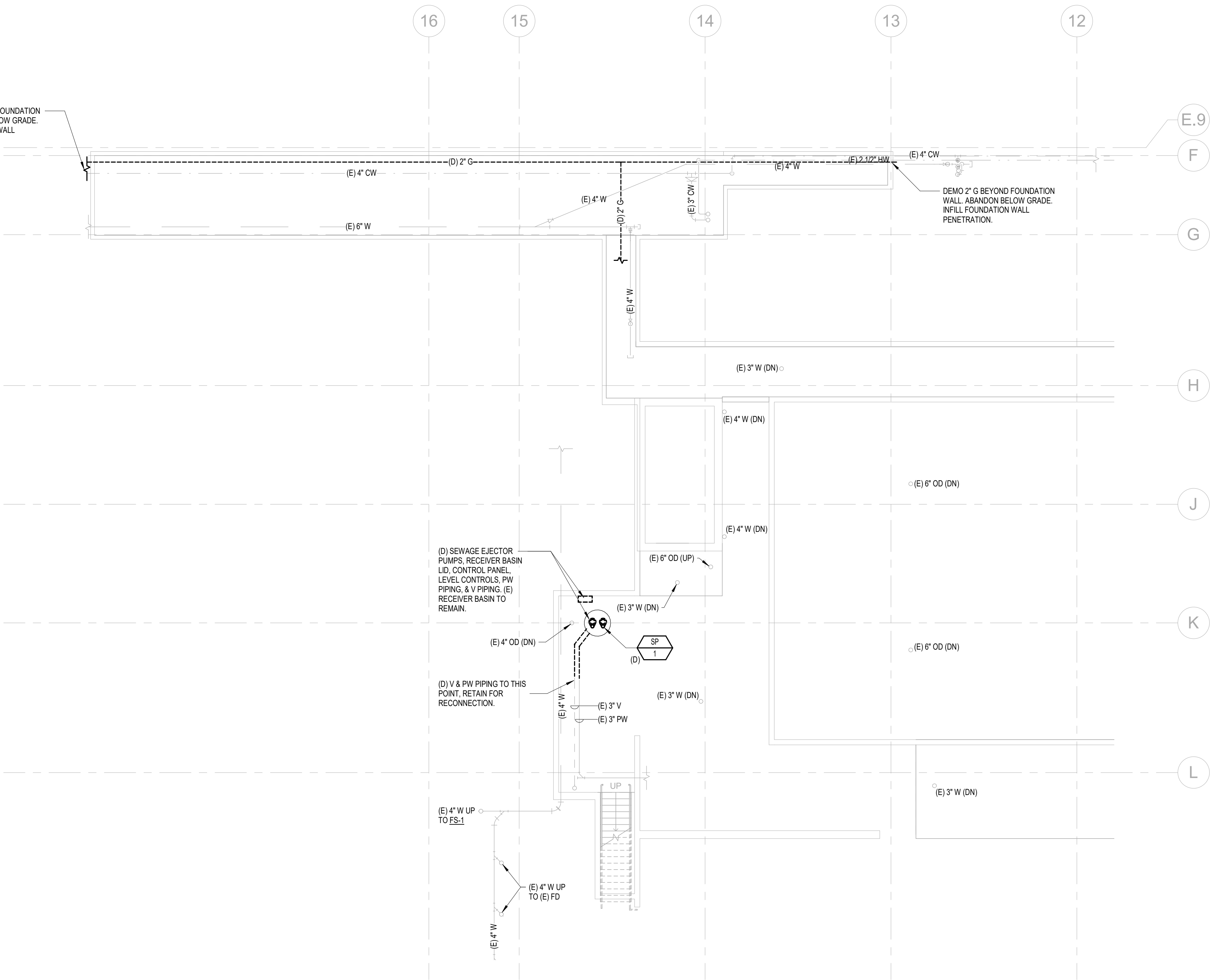


1

DEMO PLAN - QUINN BASEMENT

1/8" = 1'-0"

DEMO 2" G BEYOND FOUNDATION WALL. ABANDON BELOW GRADE. INFILL FOUNDATION WALL PENETRATION.



GENERAL NOTES:

1. INFILL CORE DRILLED OPENING THROUGH BELOW-GRADE CAST-IN-PLACE CONCRETE FOUNDATION WALL WITH NON-SHRINK CEMENTITIOUS GROUT OR CONCRETE. CLEAN AND ROUGHEN EXISTING CONCRETE SURFACES PRIOR TO INFILL. PROVIDE FLEXIBLE WATERPROOF SEAL AT PERIMETER OF INFILL. WATERPROOF INFILL TO MATCH AND MAINTAIN CONTINUITY WITH ADJACENT FOUNDATION WALL WATERPROOFING SYSTEM.


**SYSTEMS WEST
ENGINEERS**
725 A Street
Springfield, OR 97477
541.342.7210
systemswestengineers.com



EOU WEST STEAM

DISTRIBUTION MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

DEMO PLAN -
QUINN BASEMENT

MARK	DATE	DESCRIPTION

DESIGNED:	EML
DRAWN:	EML
CHECKED:	SJS

DATE:	01.23.2026
PROJECT:	Y006.03

P101



EOU WEST STEAM

DISTRIBUTION MAIN
REPLACEMENT

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LA GRANDE, OR 97850

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UNIVERSITY

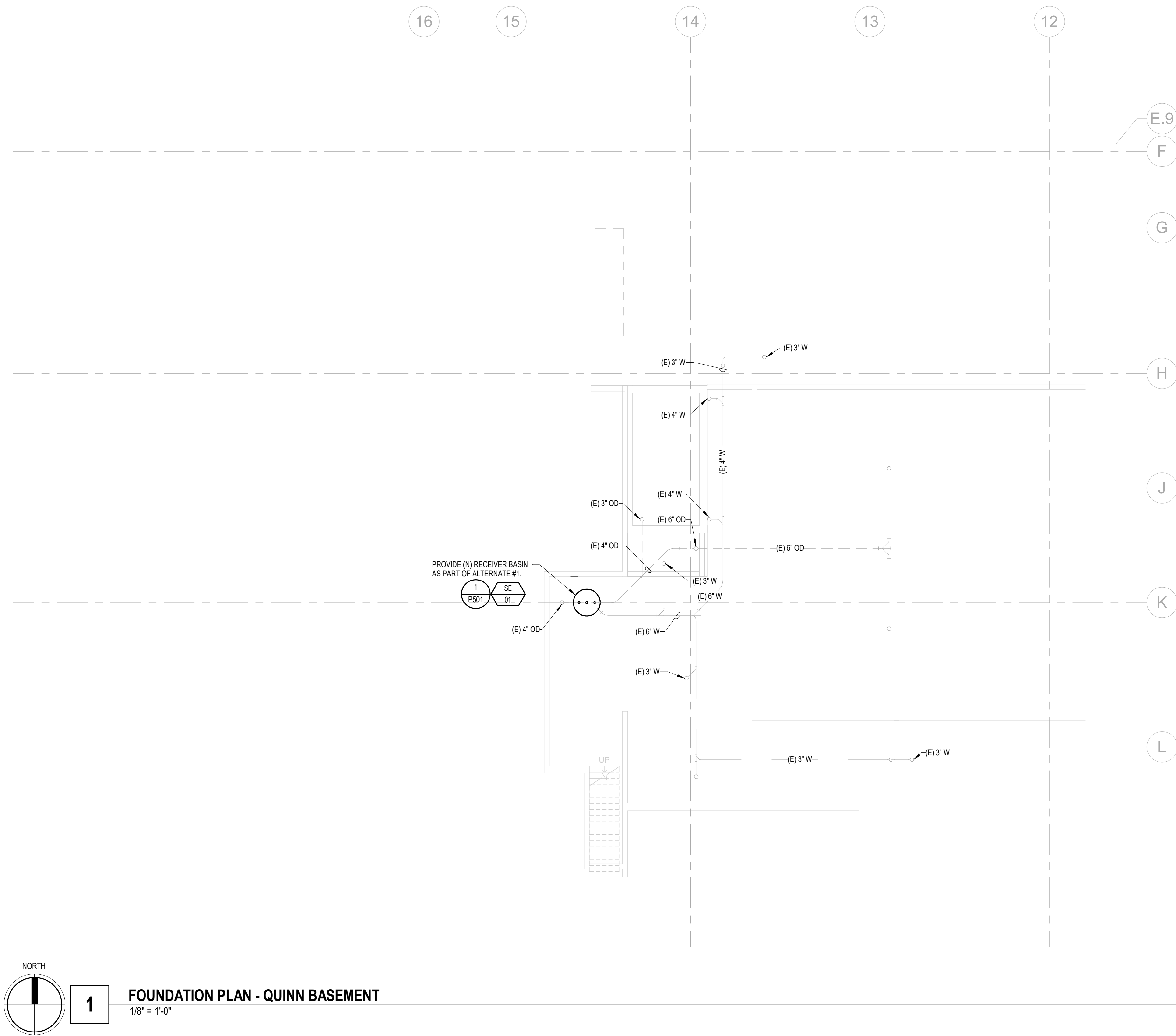
FOUNDATION PLAN
- QUINN
BASEMENT

MARK	DATE	DESCRIPTION

DESIGNED: EML
DRAWN: EML
CHECKED: SJS

DATE: 01.23.2026
PROJECT: Y006.03

P120



1 **FOUNDATION PLAN - QUINN BASEMENT**
1/8" = 1'-0"



EOU WEST STEAM

DISTRIBUTION MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

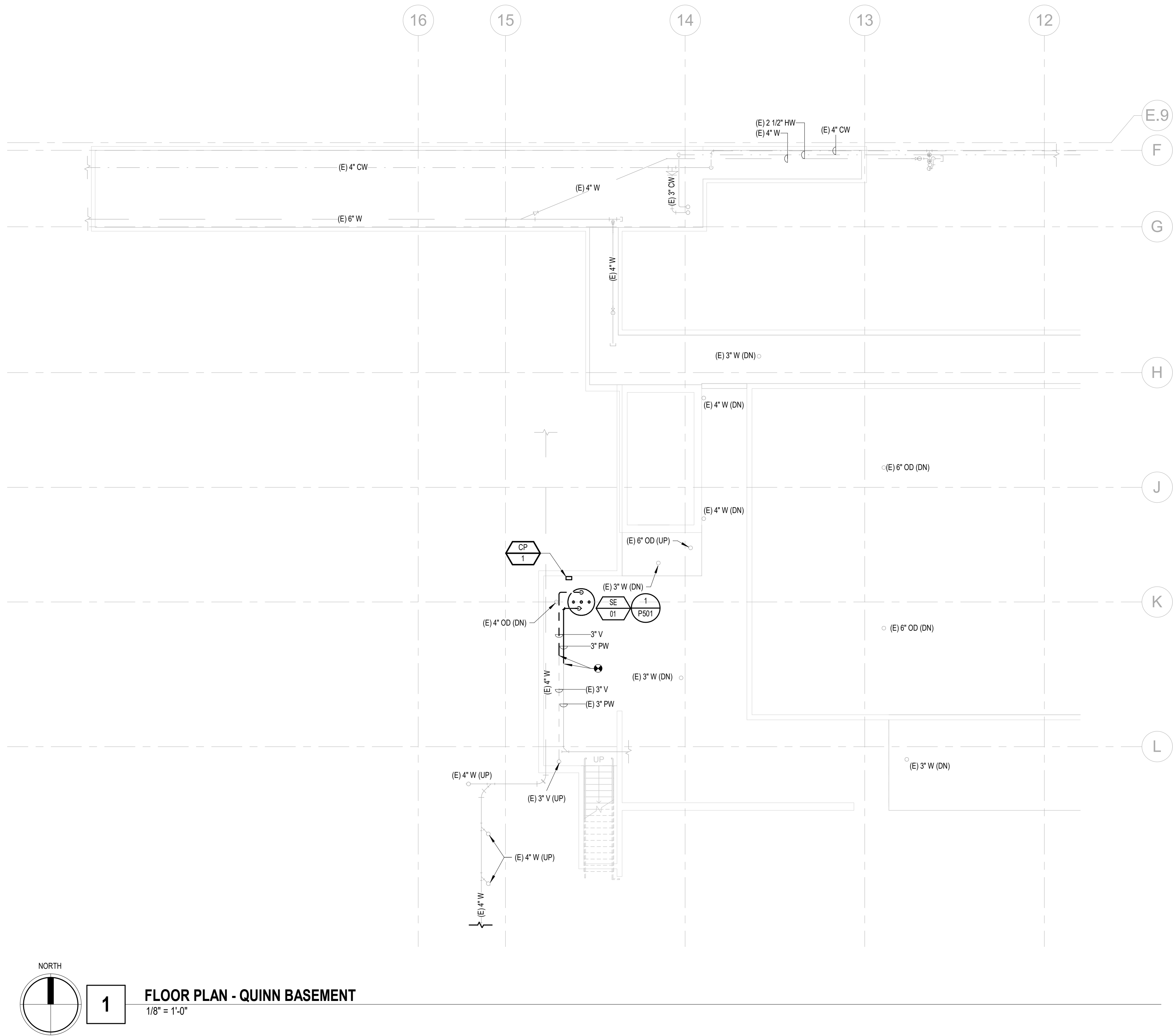
FLOOR PLAN -
QUINN BASEMENT

MARK	DATE	DESCRIPTION

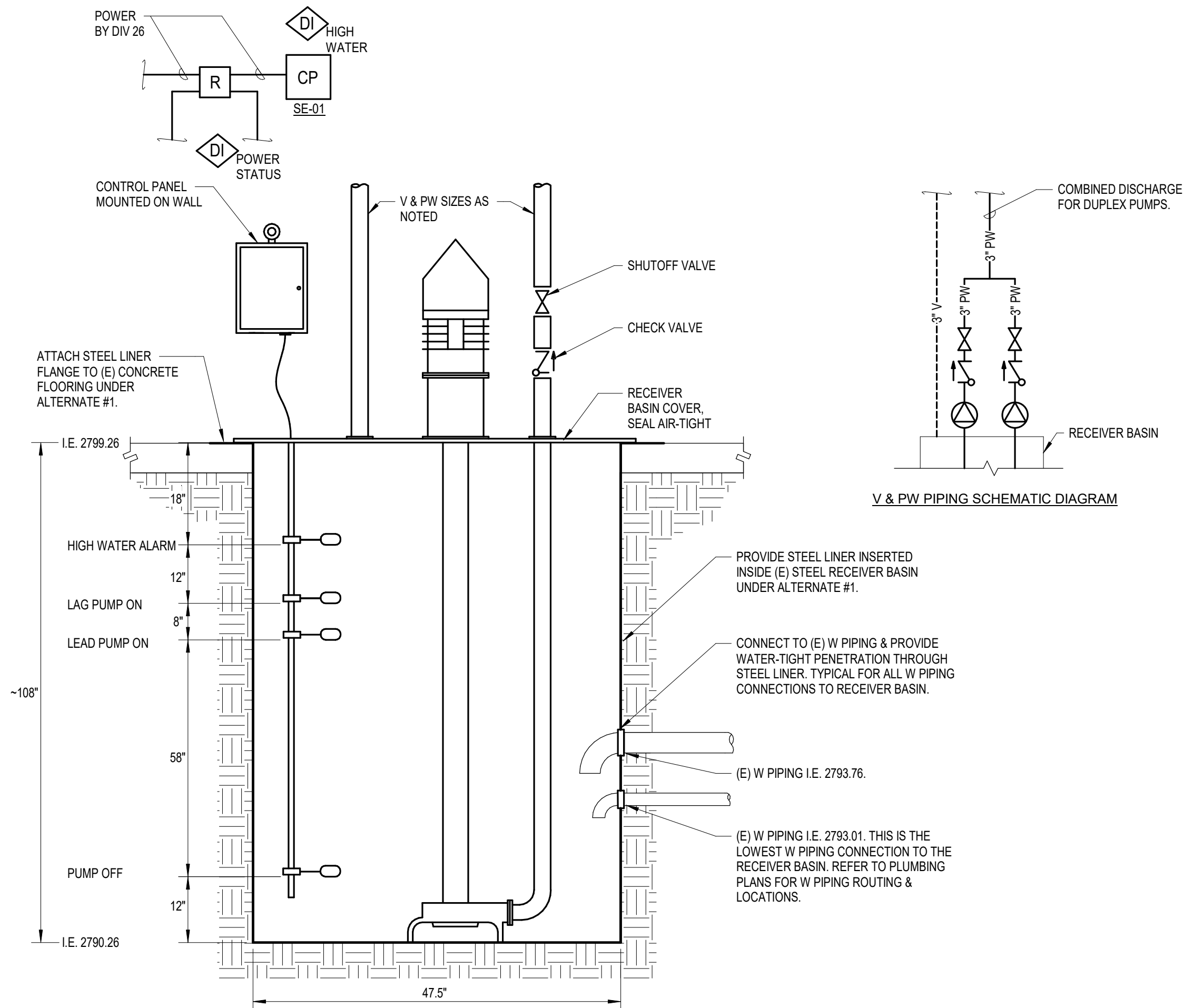
DESIGNED: EML
DRAWN: EML
CHECKED: SJS

DATE: 01.23.2026
PROJECT: Y006.03

P121



BAS POINTS LIST		
POINT TYPE	POINT NAME	PT Source
DI	SE-01 HIGH WATER ALARM	CP
DI	SE-01 POWER STATUS	CP



1

DUPLEX SEWAGE EJECTOR INSTALLATION

NOT TO SCALE



EOU WEST STEAM

DISTRIBUTION MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

DETAILS

MARK	DATE	DESCRIPTION

DESIGNED: EML
DRAWN: EML
CHECKED: SJS

DATE: 01.23.2026
PROJECT: Y006.03

P501

MECHANICAL LEGEND

PIPING

TYPES

SYMBOL	ABBREV.	DESCRIPTION
STEAM		
	MPS	MEDIUM PRESSURE STEAM 15 psi-60 psi
	LPS	LOW PRESSURE STEAM <15 psi
	MPR	MEDIUM PRESSURE CONDENSATE RETURN
	LPR	LOW PRESSURE CONDENSATE RETURN
	VR	VACUUM CONDENSATE RETURN
	PR	PUMPED CONDENSATE RETURN

SITE (REFERENCE)

	W	WATER SERVICE
	I	IRRIGATION

MISCELLANEOUS FITTINGS

SYMBOL	ABBREV.	DESCRIPTION
		WYE STRAINER
		BASKET STRAINER
		SIGHT FLOW INDICATOR
		SENSOR WELL
	MAV	MANUAL AIR VENT
	AAV	AUTOMATIC AIR VENT
		THERMOMETER
		PRESSURE GAUGE
		TEST PLUG
		WATER FLOW METER
		VENTURI
	FMS	FLOW MEASURING STATION
		SIDESTREAM FILTRATION UNIT
		STEAM TRAP

FITTINGS

SYMBOL	ABBREV.	DESCRIPTION
		PIPING UP
		PIPING DOWN
		DIRECTION OF SLOPE
		CAPPED PIPE
		PIPE REDUCING FITTING: CONCENTRIC, ECCENTRIC
		DIRECTION OF FLOW
		UNION
		FLEXIBLE PIPE CONNECTION

VALVES

SYMBOL	ABBREV.	DESCRIPTION
	DV	DRAIN VALVE WITH HOSE CONNECTION
	BV	BALL VALVE
	BFV	BUTTERFLY VALVE
	CHV	CHECK VALVE
	GV	GATE VALVE
	GBV	GLOBE VALVE
	PRV	PRESSURE REGULATING VALVE
	FMS	FLOW MEASURING STATION
	RV	RELIEF VALVE
	SRV	SAFETY RELIEF VALVE (HYDRONIC)
	SSV	STEAM SAFETY VALVE
	TPS	TEMPERATURE/PRESSURE SAFETY VALVE

AUTOMATIC VALVES

SYMBOL	ABBREV.	DESCRIPTION
	FCV	AUTOMATIC FLOW CONTROL VALVE
	AV	AUTOMATIC CONTROL VALVE: 2-WAY
	AV	AUTOMATIC CONTROL VALVE: 3-WAY
	AV	AUTOMATIC BUTTERFLY VALVE
	AV	THREE-WAY BYPASS VALVE
	SV	SOLENOID VALVE

EQUIPMENT

SYMBOL	ABBREV.	DESCRIPTION
	FD	FLOOR DRAIN
	RP	REDUCED PRESSURE BACKFLOW PREVENTER
		PUMP
	SD	PUMP SUCTION DIFFUSER
		FAN

GENERAL

SYMBOL	DESCRIPTION
	EXISTING
	DIAMETER
	NEW TO EXISTING POINT OF CONNECTION
	NOTE REFERENCE MARKER
	PLAN OR DETAIL REFERENCE MARKER
	PLAN OR DETAIL NUMBER
	SHEET NUMBER
	SECTION REFERENCE MARKER W/VIEW DIRECTION
	SECTION LETTER
	SHEET NUMBER
	EQUIPMENT TYPE
	EQUIPMENT NUMBER
	ROOM NAME
	ROOM NUMBER

CONTROL SCHEMATIC SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	RELAY OR SWITCH C = ELECTRIC CURRENT FS = FLOW SWITCH HP = HIGH PRESSURE LP = LOW PRESSURE		EMERGENCY STOP SWITCH
	ELECTRICAL CURRENT/POWER		BAS INPUT/OUTPUT POINT AI = ANALOG INPUT AO = ANALOG OUTPUT DI = DIGITAL INPUT DO = DIGITAL OUTPUT FUNCTION DESIGNATION S/S = START/STOP
	RELAY DP = DIFFERENTIAL PRESSURE		EQUIPMENT CONTROL PANEL (WEQUIP. INDICATED UNDERLINED) CP = CONTROL PANEL BCP = BOILER CONTROL PANEL CCP = CHILLER CONTROL PANEL FAP = FIRE ALARM PANEL MC = MOTOR CONTROLLER VFD = VARIABLE FREQUENCY DRIVE
	MOTOR CONTROL		
	FLOW SWITCH		
	CONTROL PANEL		

ABBREVIATIONS

ABBREV	ABBREVIATION	mA	MILLIAMPERE
ACH	AIR CHANGES PER HOUR	MA	MIXED AIR
AFF	ABOVE FINISHED FLOOR	MAX	MAXIMUM
AFS	AUTOMATIC FIRE SPRINKLER	MBH	THOUSAND BTUs per HOUR
AI	ANALOG INPUT	MCA	MINIMUM CIRCUI AMPS
AL	ALUMINUM	MERV	MINIMUM EFFICIANCY REPORTING VALUE
ALT	ALTERNATE	MFR	MANUFACTURER
AMP	AMPERE	MIN	MINIMUM
AO	ANALOG OUTPUT	MIN EFF	MINIMUM EFFICIENCY
APD	AIR PRESSURE DROP	MOP	MAXIMUM OVERCURRENT PROTECTION
AWT	AVERAGE WATER TEMPERATURE	(N)	NEW
BAS	BUILDING AUTOMATION SYSTEM	NC	NOISE CRITERIA
BHP	BRAKE HORSEPOWER	NC	NORMALLY CLOSED
BOD	BOTTOM OF DUCT	NIC	NOT IN CONTRACT
BTUH	BRITISH THERMAL UNITS PER HOUR	NO	NORMALLY OPEN
CFH	CUBIC FEET per HOUR	NPLV	NON-STANDARD PART LOAD VALUE
CFM	CUBIC FEET per MINUTE	NPSH	NET POSITIVE SUCTION HEAD
CMU	CONCRETE MASONRY UNIT	NR	NOT REQUIRED
CONC	CONCRETE	OAT	OUTSIDE AIR TEMPERATURE
CONT	CONTINUATION	OCC	OCCUPIED
CU FT	CUBIC FEET	OCFI	OWNER FURNISHED/ CONTRACTOR INSTALLED
D	DEPTH	OSA	OUTSIDE AIR PRESSURE DROP
(D)	DEMOLITION	PD	PRESSURE DROP
DB	DRY BULB	PH	PHASE
DBa	DECIBELS ACOUSTIC	PPH	POUNDS per HOUR
DDC	DIRECT DIGITAL CONTROL	PSI	POUNDS per SQUARE INCH
DEMO	DEMOLITION	PSIG	POUNDS per SQUARE INCH GAUGE
DI	DIGITAL INPUT	RA	RETURN AIR
DN	DOWN	RAT	RETURN AIR TEMPERATURE REQUIRED
DO	DIGITAL OUTPUT	REQ'D	REQUIRED
DP	DIFFERENTIAL PRESSURE	RG	RETURN GRILLE
DX	DIRECT EXPANSION	RH	RELATIVE HUMIDITY
(E)	EXISTING	RL	REFRIGERANT LIQUID
EA	EXHAUST AIR	RLA	RUNNING LOAD AMPS
EAT	ENTERING AIR TEMPERATURE	RS	REFRIGERANT SUCTION
ECM	ELECTRONICALLY COMMUTATED MOTOR	RPM	REVOLUTIONS PER MINUTE
EER	ENERGY EFFICIENCY RATIO	SA	SUPPLY AIR
EFG	EFFICIENCY	SAT	SUPPLY AIR TEMPERATURE
EG	EXHAUST GRILLE	SCFM	STANDARD CUBIC FEET PER MINUTE
EMS	ENERGY MANAGEMENT SYSTEM	SD	SUPPLY DIFFUSER
ENT	ENTERING	SEER	SEASONAL ENERGY EFFICIENCY RATIO
ESP	EXTERNAL STATIC PRESSURE	SP	STATIC PRESSURE
EWI	ENTERING WATER TEMPERATURE	SS	STAINLESS STEEL
'F	DEGREES FAHRENHEIT	STL	STEEL
FLA	FULL LOAD AMPS	TEMP	TEMPERATURE
FP	FIRE PROTECTION	TDH	TOTAL DYNAMIC HEAD
FPM	FEET PER MINUTE	TP	TOTAL PRESSURE
FPM	FEET PER MINUTE	TSP	TOTAL STATIC PRESSURE
FPS	FEET PER SECOND	TYP	TYPICAL
FT	FEET	V	VOLT
FT2	SQUARE FEET	VFD	VARIABLE FREQUENCY DRIVE
FT WC	FEET WATER COLUMN	VP	VELOCITY PRESSURE
FUT	FUTURE	VSD	VARIABLE SPEED DRIVE
GALV	GALVANIZED	W	WATTS
GPH	GALLONS PER HOUR	WB	WET BULB
GPM	GALLONS PER MINUTE	WPD	WATER PRESSURE DROP
GYP BD	GYP SUM WALL BOARD	WC	WATER COLUMN
H	HEIGHT	WG	WATER GAUGE
HP	HORSEPOWER		
HR	HEAT RECOVERY		
HSPF	HEATING SEASONAL PERFORMANCE FACTOR		
HVAC	HEATING, VENTILATING, & AIR CONDITIONING		
HZ	HERTZ (CYCLES PER SECOND)		
IAQ	INDOOR AIR QUALITY		
IN	INCHES		
IN WC	INCHES WATER COLUMN		
IPLV	INTEGRATED PART LOAD VALUE		
IW	INDIRECT WASTE		
KW	KILOWATT		
L	LENGTH		
LAT	LEAVING AIR TEMPERATURE		
LBS	POUNDS		
LON	LOCAL OPERATING NETWORK		
LVG	LEAVING		
LWT	LEAVING WATER TEMPERATURE		

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 PIPING AND OTHER MECHANICAL EQUIPMENT IS APPROXIMATE. CONTRACTOR SHALL SITE VERIFY THE LOCATION OF EXISTING PIPING AND EQUIPMENT AND CONSTRUCT WORK FROM FIELD DIMENSIONS. CONTRACTOR SHALL MAKE ADJUSTMENTS NECESSARY TO ACCOMMODATE MINOR DEVIATIONS AT NO COST TO OWNER.
3. FINE (LIGHT) LINE WORK INDICATES EXISTING PIPING AND OTHER MECHANICAL EQUIPMENT. BOLD (HEAVY) LINE WORK INDICATES NEW PIPING AND OTHER MECHANICAL EQUIPMENT.
4. IT IS RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE CUTTING AND PATCHING TO ALLOW THE INSTALLATION OF MATERIALS AND EQUIPMENT AS SPECIFIED AND SHOWN ON DRAWINGS.

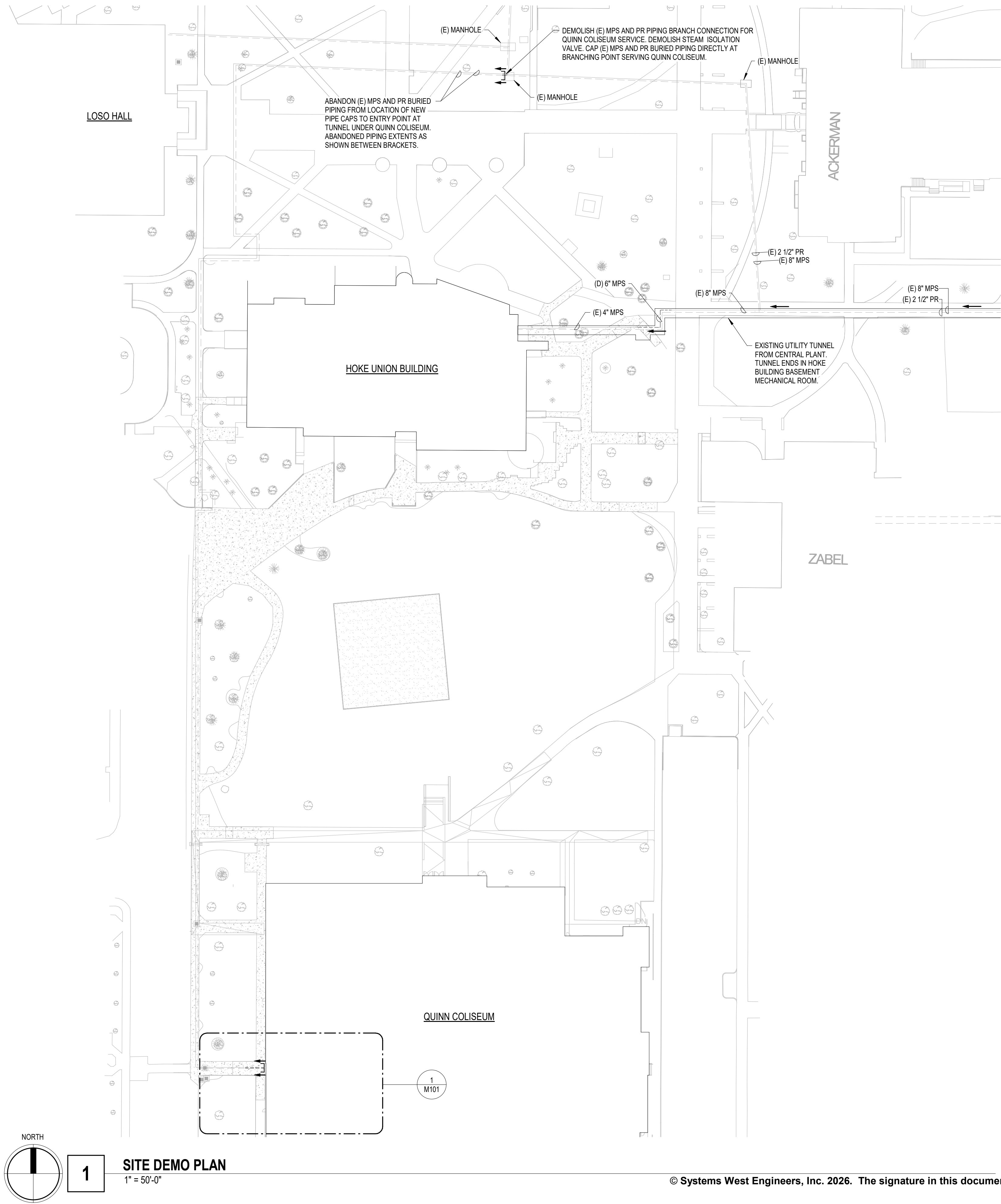
DEMOLITION NOTES

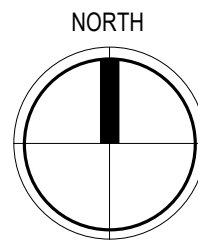
1. DEMOLISH EQUIPMENT, FIXTURES, DEVICES, PIPING, CONDUIT, FITTINGS, AND APPURTENANCES INTERIOR TO THE BUILDING THAT ARE MADE OBSOLETE BY THE NEW WORK AND/OR ARE ABANDONED AND NO LONGER IN USE.
2. PROTECT AND MAINTAIN OPERABLE EXISTING EQUIPMENT, FIXTURES, OR SYSTEMS THAT ARE INDICATED TO REMAIN, INCLUDING ELECTRICAL POWER, CONTROLS, AND RELATED SYSTEMS REQUIRED TO MAINTAIN OPERABILITY.
3. EXISTING CONDITIONS SHOWN ARE BASED ON RECORD DOCUMENTS AND LIMITED FIELD OBSERVATIONS OF ACCESSIBLE AREAS AND MAY NOT SHOW THE ENTIRE SCOPE OF DEMOLITION WORK. OMISSION OF EXISTING EQUIPMENT, FIXTURES, DEVICES, PIPING, CONDUIT, FITTINGS, AND APPURTENANCES FROM THE DEMOLITION DRAWINGS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PROVIDE DEMOLITION OF SYSTEMS THAT ARE MADE OBSOLETE BY THE NEW WORK, ARE ABANDONED, OR AS OTHERWISE REQUIRED TO PERFORM THE WORK DESCRIBED HEREIN.
4. PROTECT AND MAINTAIN SERVICES TO REMAIN OPERATIONAL THAT PASS THROUGH THE AREA OF CONSTRUCTION. WHERE IT IS NOT POSSIBLE TO MAINTAIN THESE SERVICES INTACT, REPLACE, REROUTE, MODIFY, OR PROVIDE NEW AS REQUIRED TO MAINTAIN SERVICES.

EQUIPMENT ABBREVIATIONS

AAV	AUTOMATIC AIR VENT	HC	HOT WATER COIL
AC	AIR CONDITIONER	HP	HEAT PUMP
ACB	ACTIVE CHILLED BEAM	HR	HEAT RECOVERY EXCHANGER
AD	AUTOMATIC DAMPER	HRC	HEAT RECOVERY COIL
AF	AIR CURTAIN	HRU	HEAT RECOVERY UNIT
AHU	AIR HANDLING UNIT	HRV	HEAT RECOVERY VENTILATOR
AS	AIR SEPARATOR	HUM	HUMIDIFIER
B	BOILER	HWP	HEATING WATER PUMP
BD	BALANCING DAMPER	HX	HEAT EXCHANGER
BDD	BACK DRAFT DAMPER	L	LOUVER
BF	BOILER FEED	LEF	LABORATORY EXHAUST FAN
BF	BOOSTER FAN	MZ	MAKE UP AIR UNIT
CB	CHILLED BEAM	MUA	MULTI-ZONE
CC	CHILLED WATER COIL	OAH	OUTSIDE AIR HOOD
CF	CHEMICAL FEED PUMP	OB	OPPOSITE BLADE DAMPER
CFT	CHEMICAL FEED TANK	OSL	OUTSIDE AIR LOUVER
CH	CHILLER	P	PUMP
CP	CIRCULATING PUMP	PF	PREFILTER
CT	COOLING TOWER	PHX	POOL HEAT EXCHANGER
CU	CONDENSING UNIT	PTAC	PACKAGED TERMINAL AIR CONDITIONER
CRU	CONDENSATE RETURN UNIT	RF	RETURN FAN
CV	CONTROL VALVE	RH	RELIEF HOOD
CWP	CHILLED WATER PUMP	RU	ROOF TOP UNIT
EAL	EXHAUST AIR LOUVER	SA	SOUND ATTENUATOR
EDH	ELECTRIC DUCT HEATER	SF	SUPPLY FAN
EF	EXHAUST FAN	SG	SUPPLY GRILLE
EH	EXHAUST HOOD	SH	STEAM HEAT EXCHANGER
ET	EXPANSION TANK	ST	STORAGE TANK
FC	FAN COIL UNIT	TP	TOWER PUMP
FD	FLOW CONTROL DEVICE	TU	TERMINAL UNIT
FF	FIRE DAMPER	UH	UNIT HEATER
FF	FINAL FILTER	VD	VOLUME DAMPER
FGD	FIRE SMOKE DAMPER	VP	VACUUM PUMP
FS	GLYCOL FEEDER		

1/23/2026 4:20:39 PM
PLOTTED BY JSH ON:





1" = 50'-0"

- 1 CONCRETE ANCHOR BLOCK BY CIVIL. SEE 2/M501 FOR PIPING ANCHOR DETAIL.
- 2 EXPANSION LOOP MINIMUM DIMENSION FOR MPS PIPING IS 12' HIGH x 10' WIDE. FOR PR PIPING MINIMUM EXPANSION LOOP DIMENSION IS 7' HIGH x 3.5' W x 7' HIGH.



DISTRIBUTION MAIN REPLACEMENT

OWNER:
EASTERN OREGON
UNIVERSITY

SITE PLAN

MARK	DATE	DESCRIPTION

DESIGNED: MLO

DRAWN: JSH

CHECKED: GNL

DATE: 01.23.2026

PROJECT: Y006.03

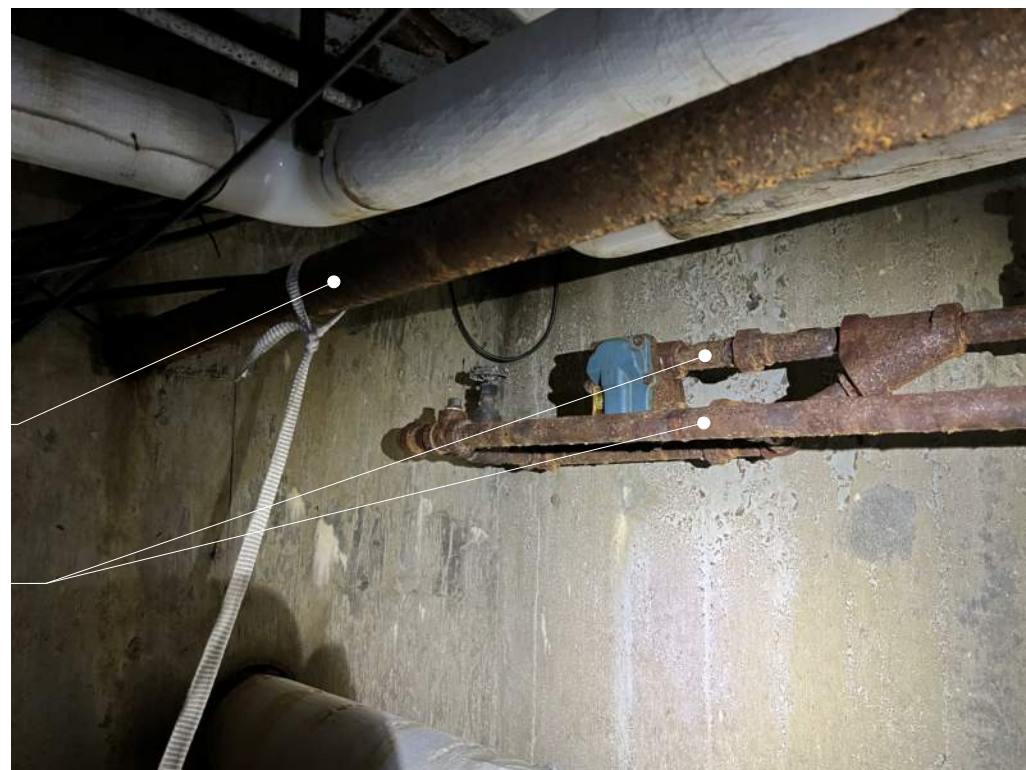
M099

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1/23/2026 4:20:42 PM

PLOTTED BY JSH ON:

DEMOLISH FULL EXTENT
OF LPS AND LPR PIPING
WITH STEAM.



2 LOOKING WEST TUNNEL END

DEMOLISH FULL
EXTENTS OF LPS
AND LPR PIPING.



3 LOOKING WEST NEAR PRV

DEMOLISH FULL
EXTENT OF LPS
AND LPR PIPING.



4 **LOOKING EAST NEAR PRV**
NOT TO SCALE

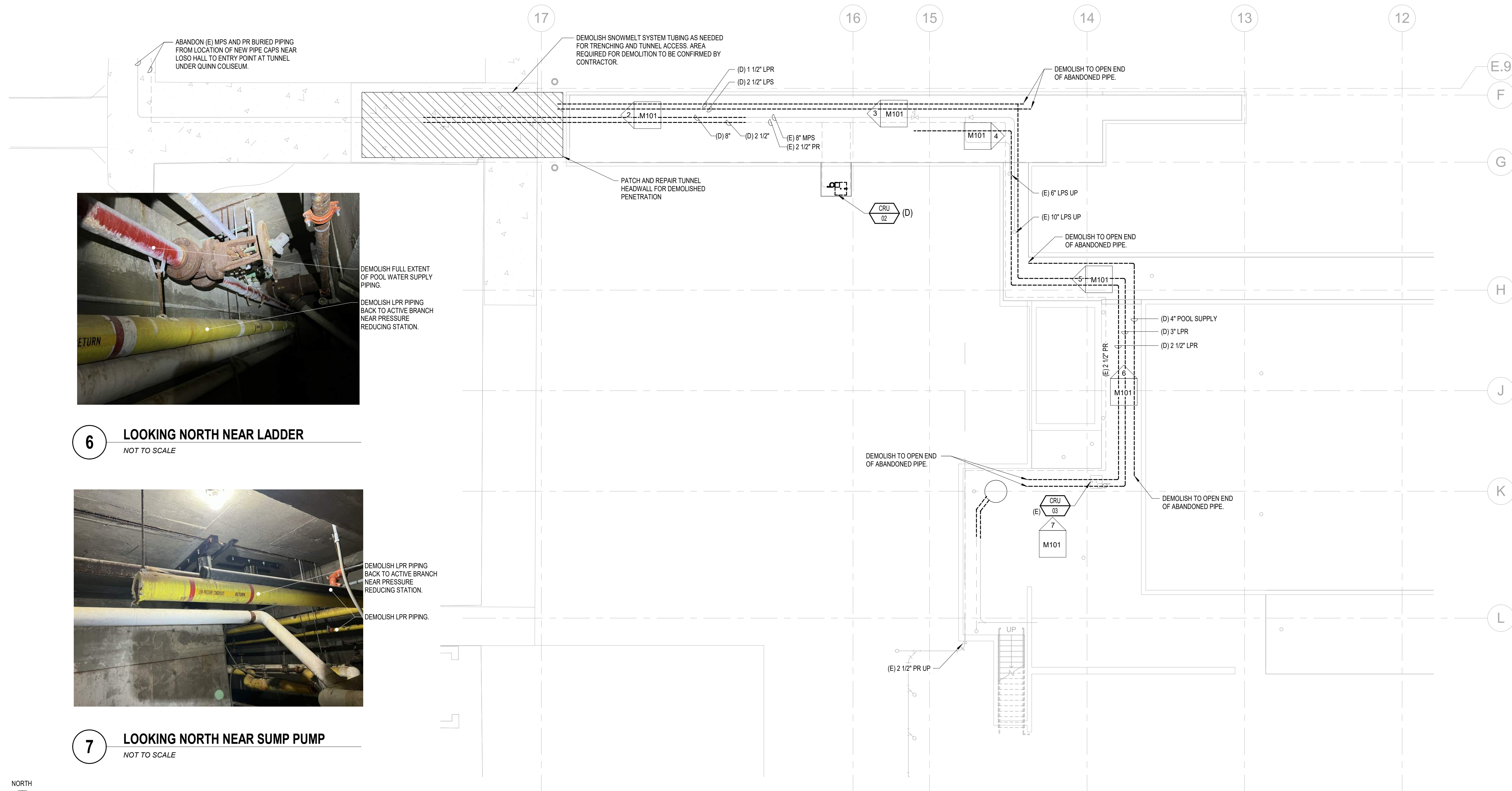
GENERAL NOTES:

1. CONTRACTOR TO VERIFY PIPING TO BE DEMOLISHED. PIPE SIZING AND ROUTING IS APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO COMMENCING WORK.
2. INFILL CORE DRILLED OPENING THROUGH BELOW-GRADE CAST-IN-PLACE CONCRETE FOUNDATION WALL WITH NON-SHRINK CEMENTITIOUS GROUT OR CONCRETE. CLEAN AND ROUGHEN EXISTING CONCRETE SURFACES PRIOR TO INFILL. PROVIDE FLEXIBLE WATERPROOF SEAL AT PERIMETER OF INFILL. WATERPROOF INFILL TO MATCH AND MAINTAIN CONTINUITY WITH ADJACENT FOUNDATION WALL WATERPROOFING SYSTEM.

DEMOLISH FULL EXTENT
OF POOL SUPPLY PIPING.



5 **LOOKING WEST NEAR LADDER**
NOT TO SCALE



6 **LOOKING NORTH NEAR LADDER**
NOT TO SCALE

DEMOLISH FULL EXTENT
OF POOL WATER SUPPLY
PIPING.

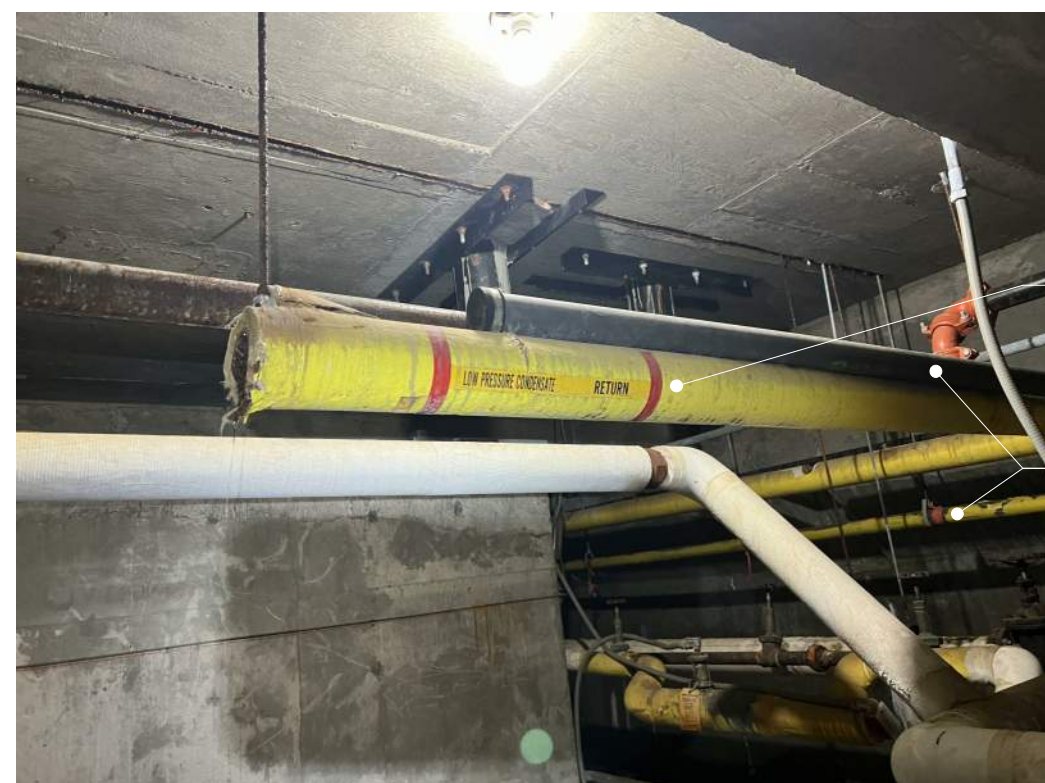
DEMOLISH LPR PIPING
BACK TO ACTIVE BRANCH
NEAR PRESSURE
REDUCING STATION.



7 **LOOKING NORTH NEAR SUMP PUMP**
NOT TO SCALE

DEMOLISH LPR PIPING
BACK TO ACTIVE BRANCH
NEAR PRESSURE
REDUCING STATION.

DEMOLISH LPR PIPING.



DEMO PLAN - QUINN BASEMENT
1/8" = 1'-0"

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**SYSTEMS WEST
ENGINEERS**

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Springfield, OR 97477
541.342.7210
systemswestengineers.com



EOU WEST STEAM

DISTRIBUTION MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

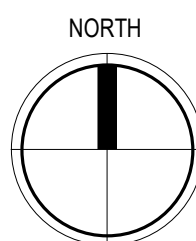
DEMO PLAN -
QUINN BASEMENT

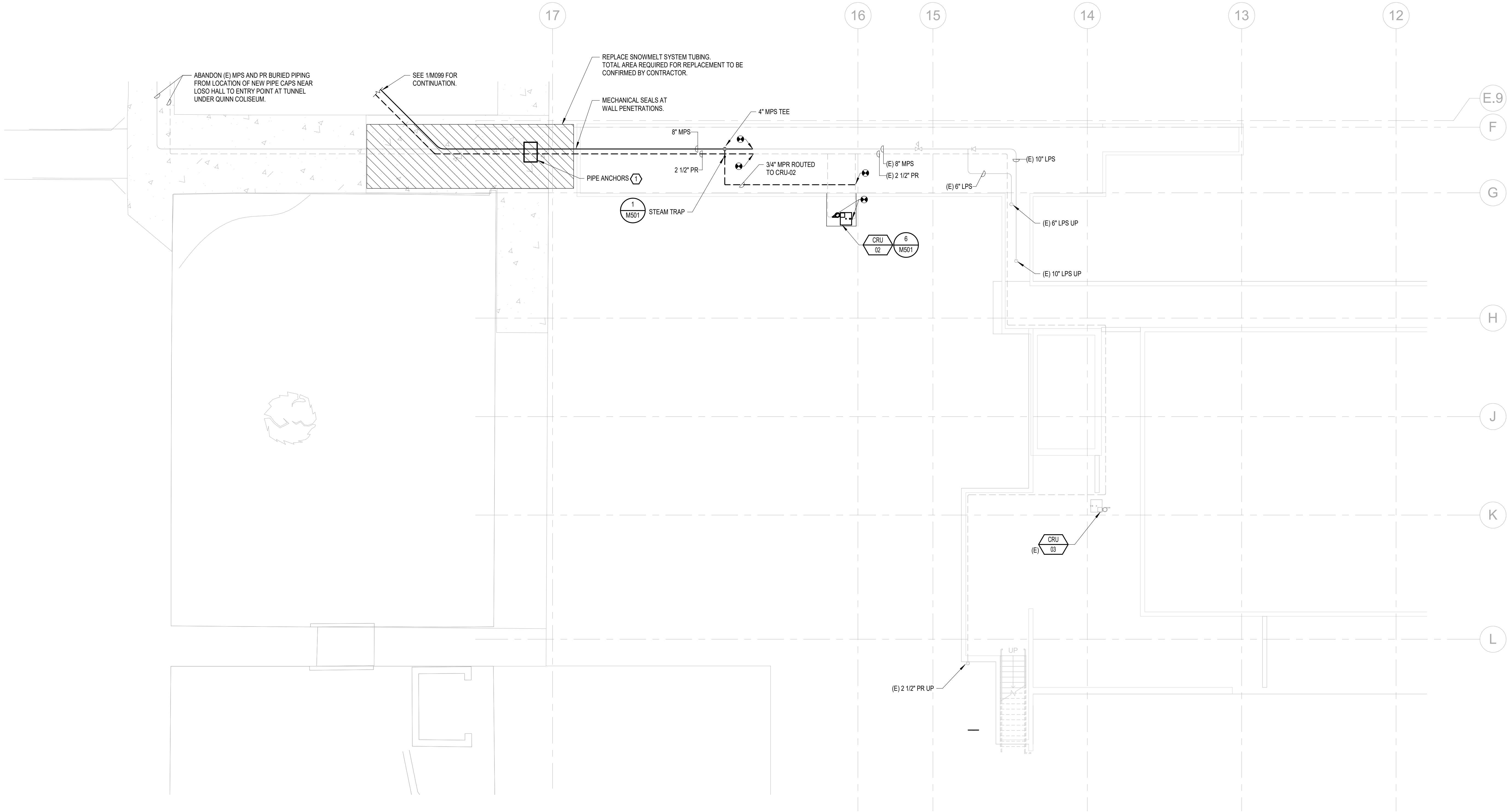
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DATE: 01.23.2026

PROJECT: Y006.03

M101





REGISTERED PROFESSIONAL
ENGINEER
#95772
DIGITALLY SIGNED
OREGON
J. JENKINS
JANUARY 14, 2025
EXPIRES: 06-30-2027

EOU WEST STEAM

DISTRIBUTION MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
EASTERN OREGON
UNIVERSITY

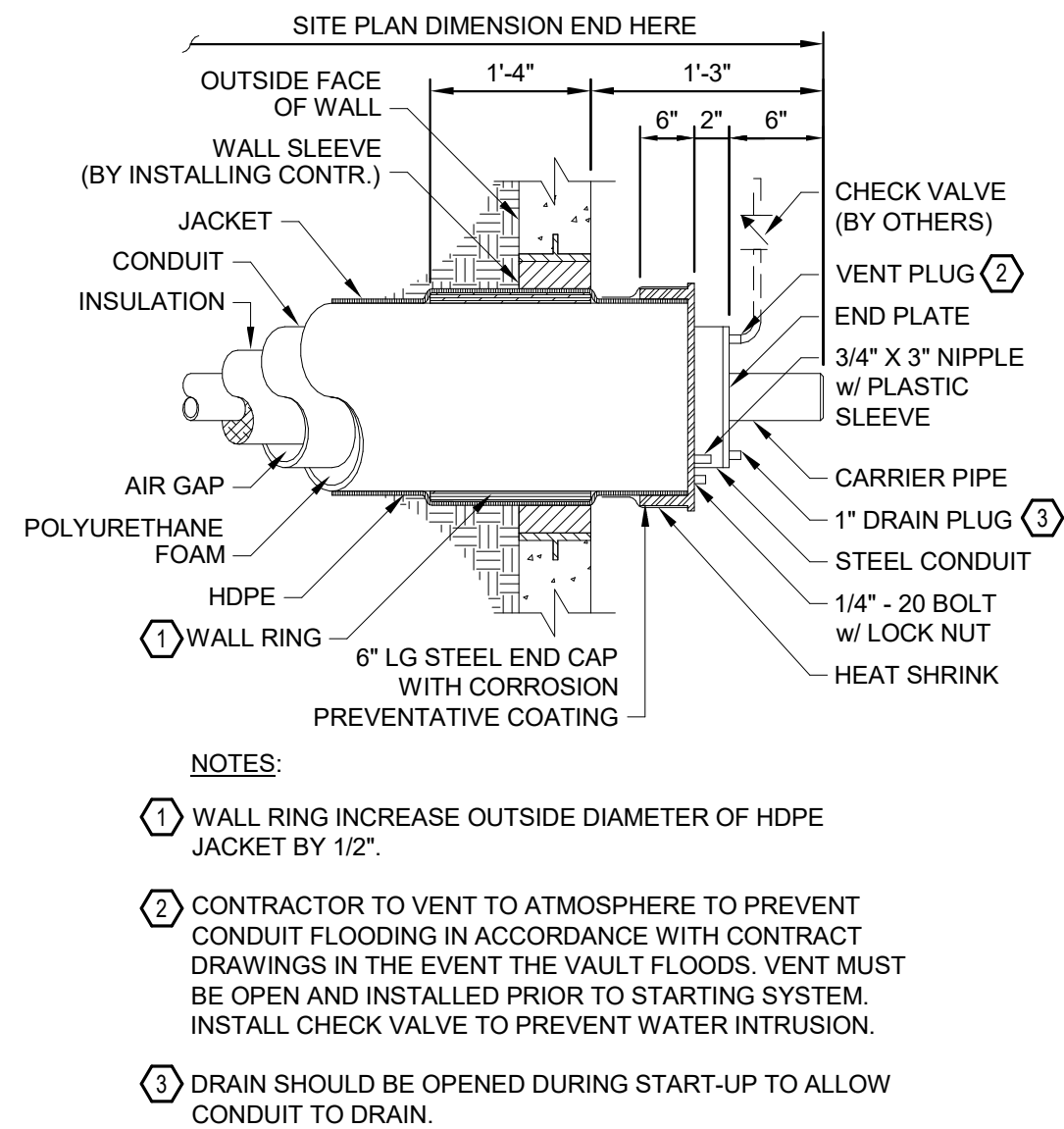
FLOOR PLAN -
QUINN BASEMENT

MARK	DATE	DESCRIPTION
DESIGNED:	MLO	
DRAWN:	JSH	
CHECKED:	GNL	

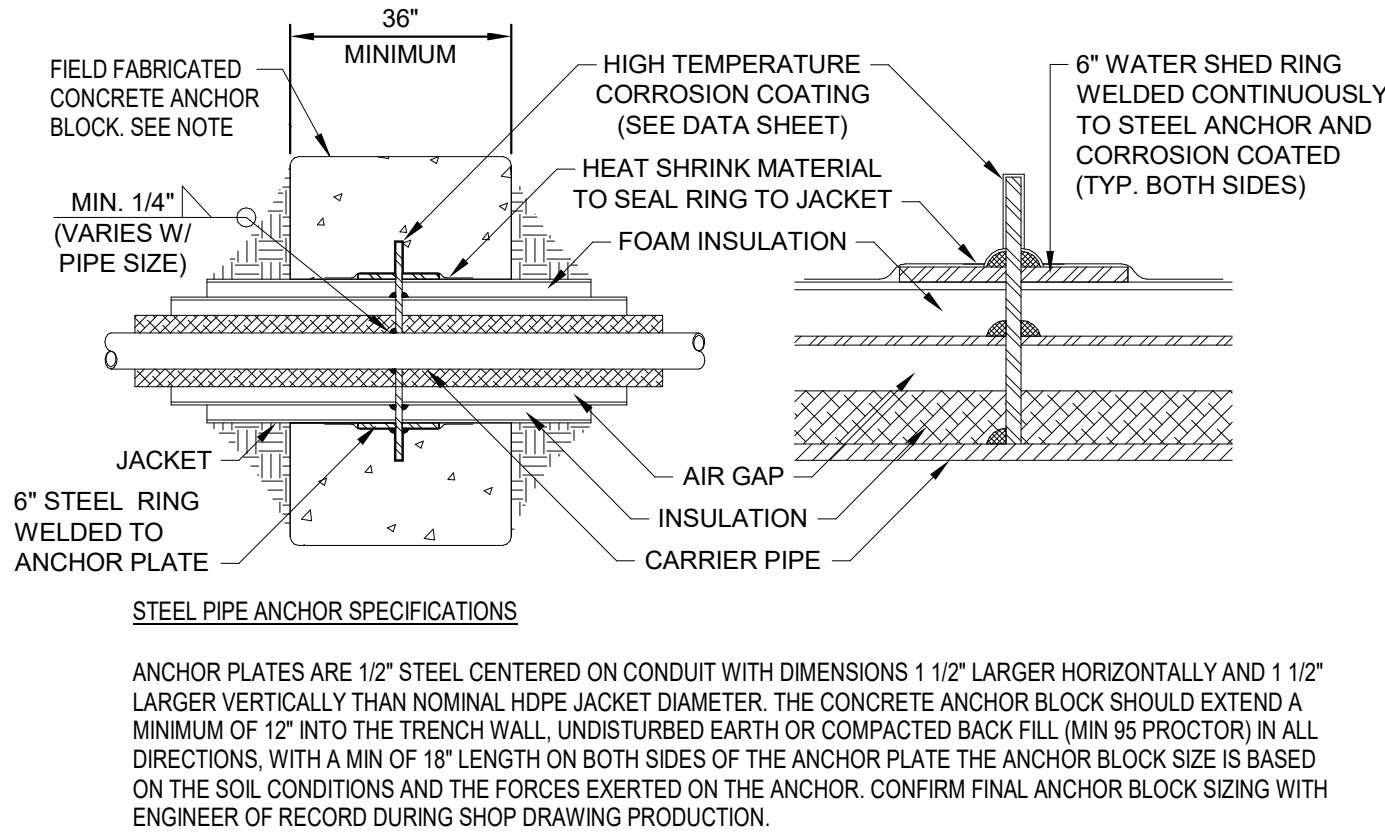
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PROJECT: Y006.03

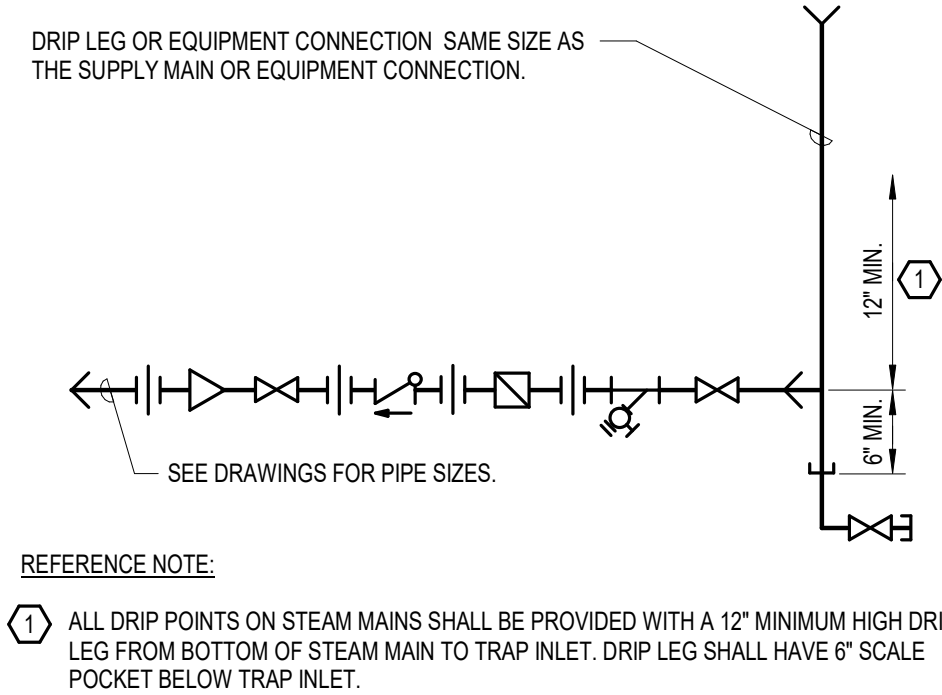
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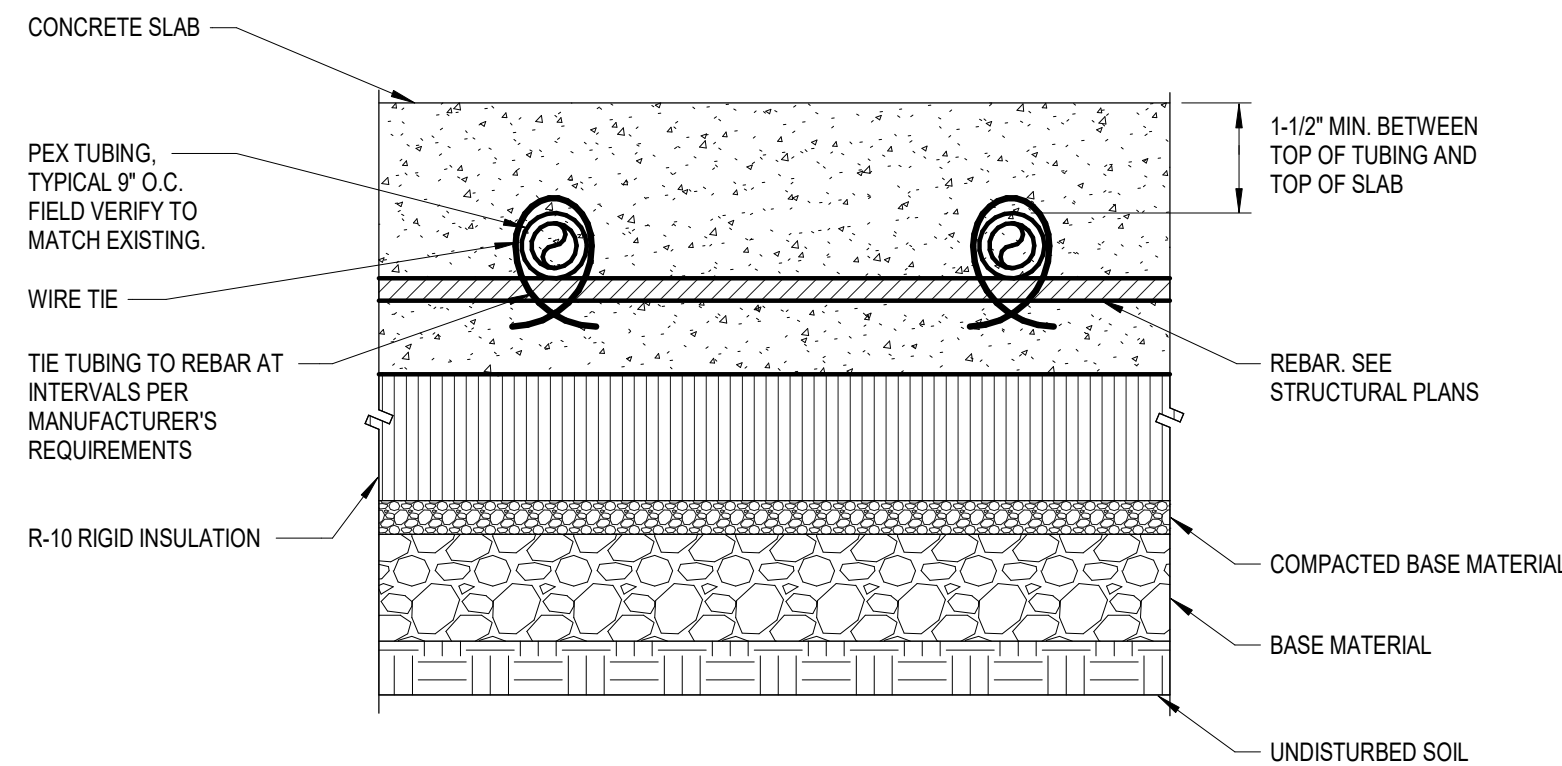
3 WALL PENETRATION DETAIL
NOT TO SCALE



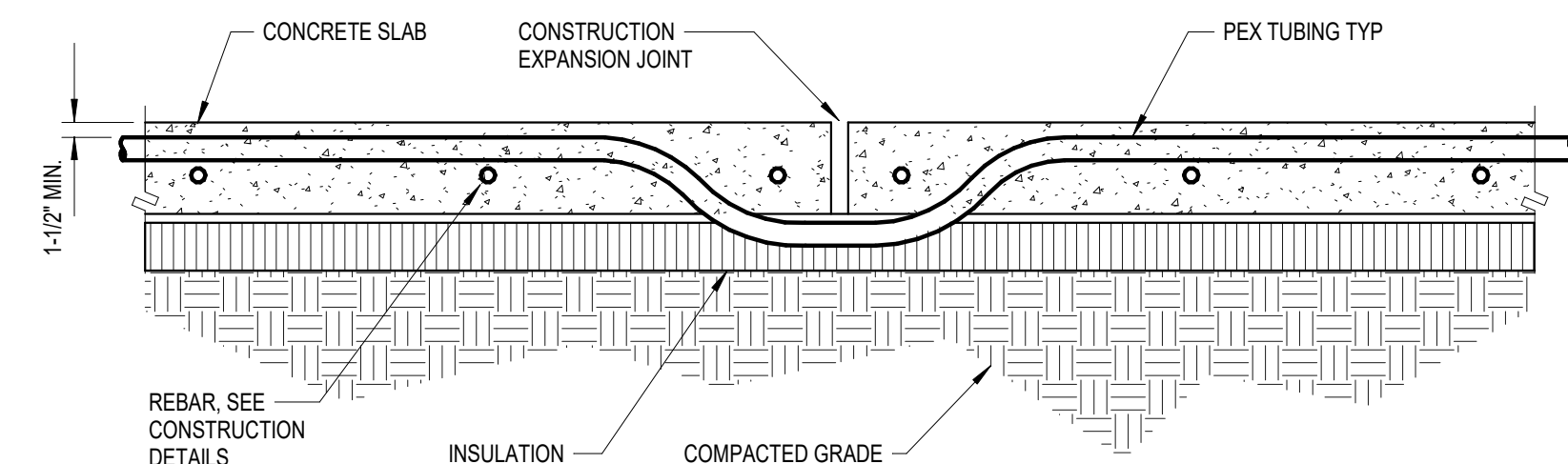
2 ANCHOR DETAIL
NOT TO SCALE



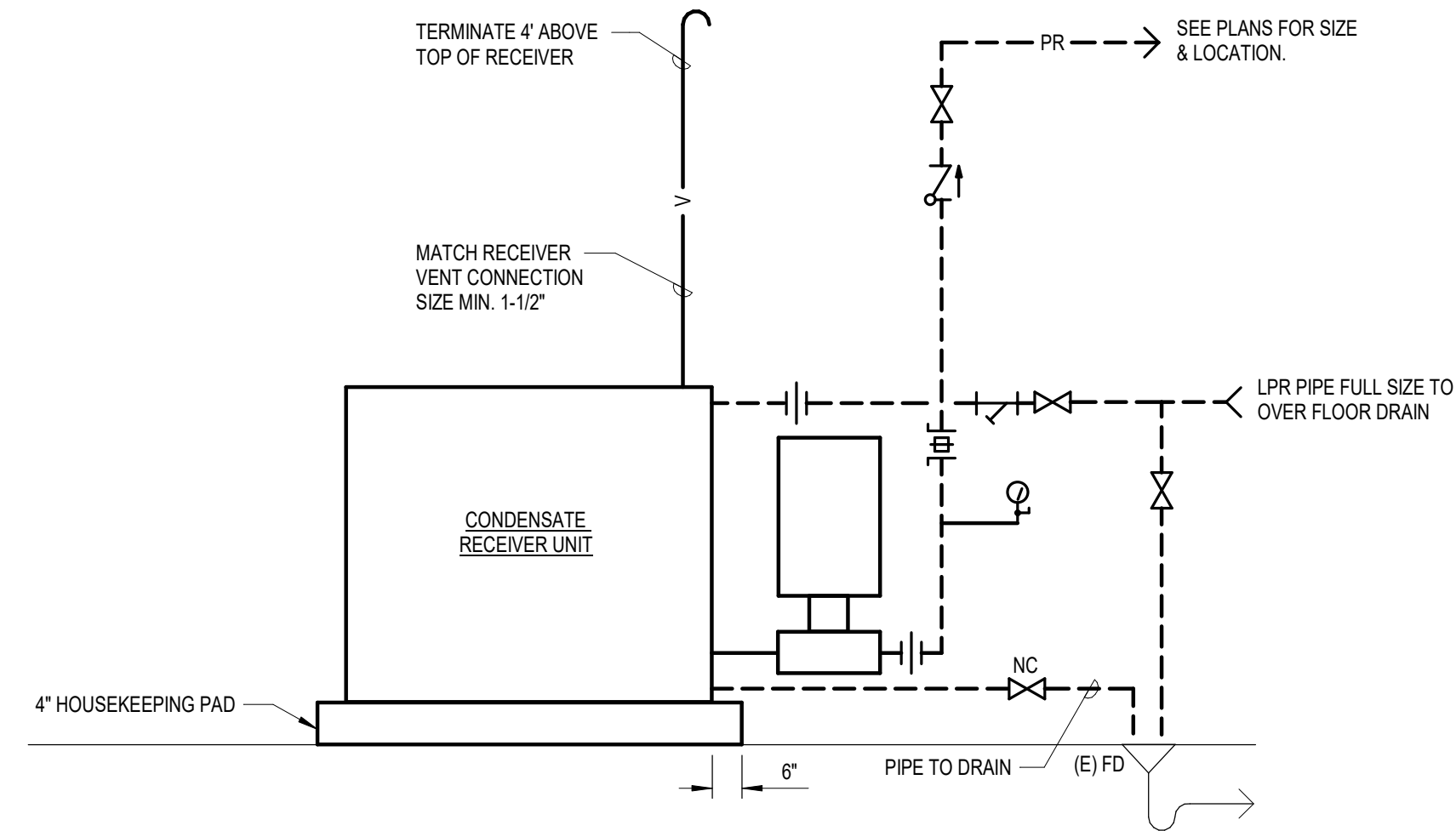
1 STEAM TRAP - FLOAT AND THERMOSTATIC
NOT TO SCALE



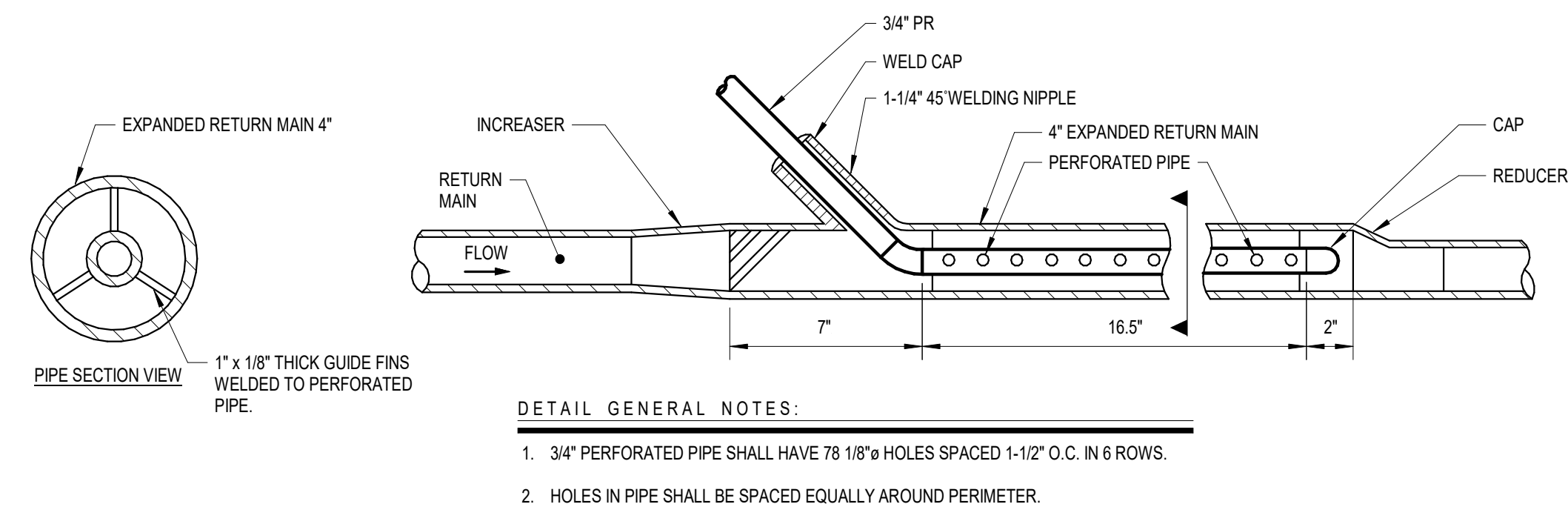
4 SNOW MELT TUBING - CONSTRUCTION DETAIL
NOT TO SCALE



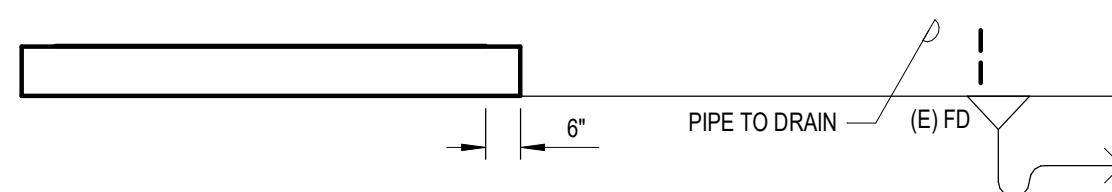
5 SNOW MELT TUBING CONCRETE INSTALLATION
NOT TO SCALE



6 SIMPLEX CONDENSATE RETURN UNIT
NOT TO SCALE



7 HIGH PRESSURE CONDENSATE RETURN FLASH ARRESTOR
NOT TO SCALE



8 EQUIPMENT PAD
NOT TO SCALE



EOU WEST STEAM

DISTRIBUTION MAIN
REPLACEMENT

LOCATION:
ONE UNIVERSITY BLVD.
LA GRANDE, OR 97850

OWNER:
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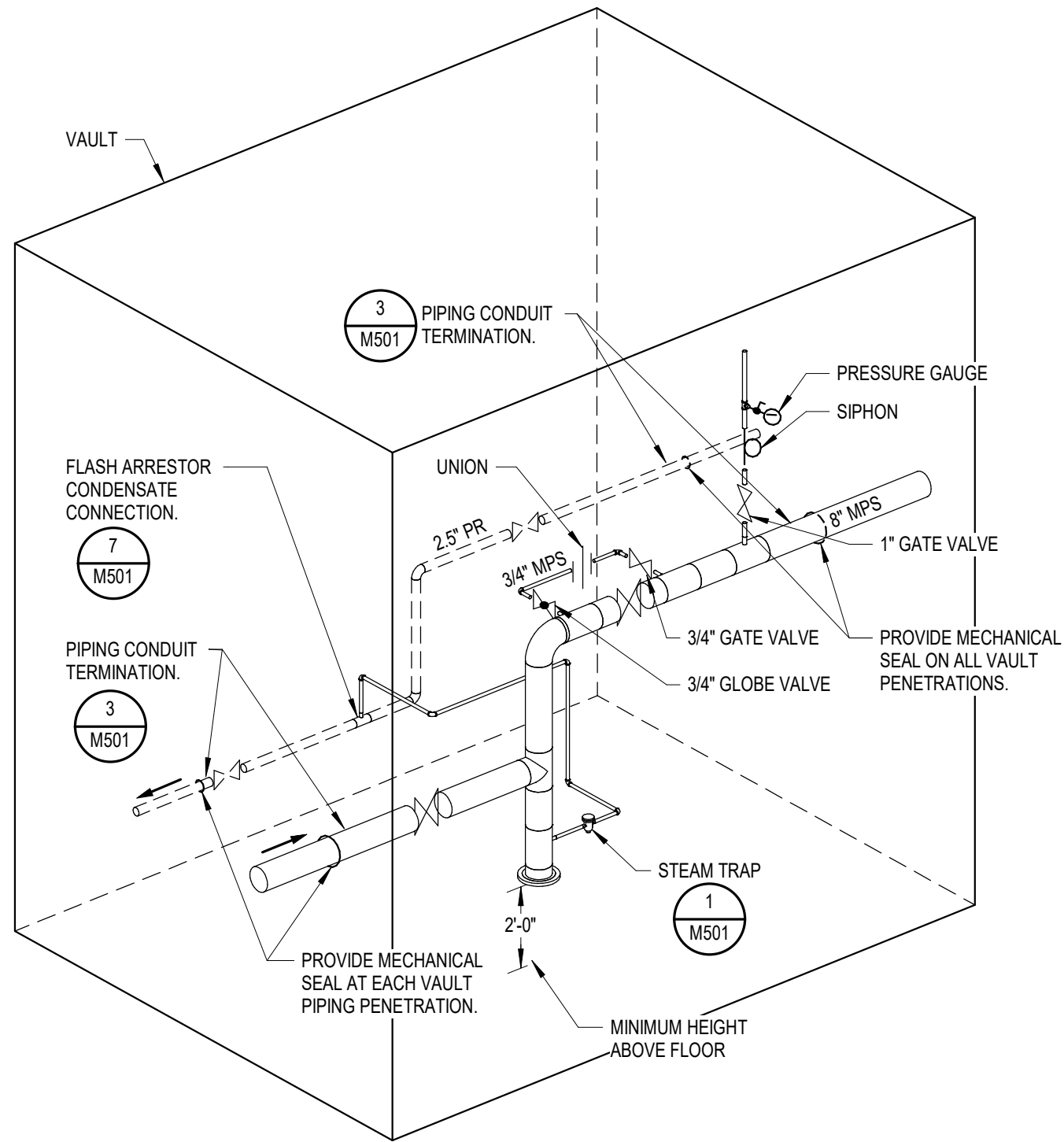
VAULT DETAILS &
TUNNEL SECTIONS

MARK	DATE	DESCRIPTION

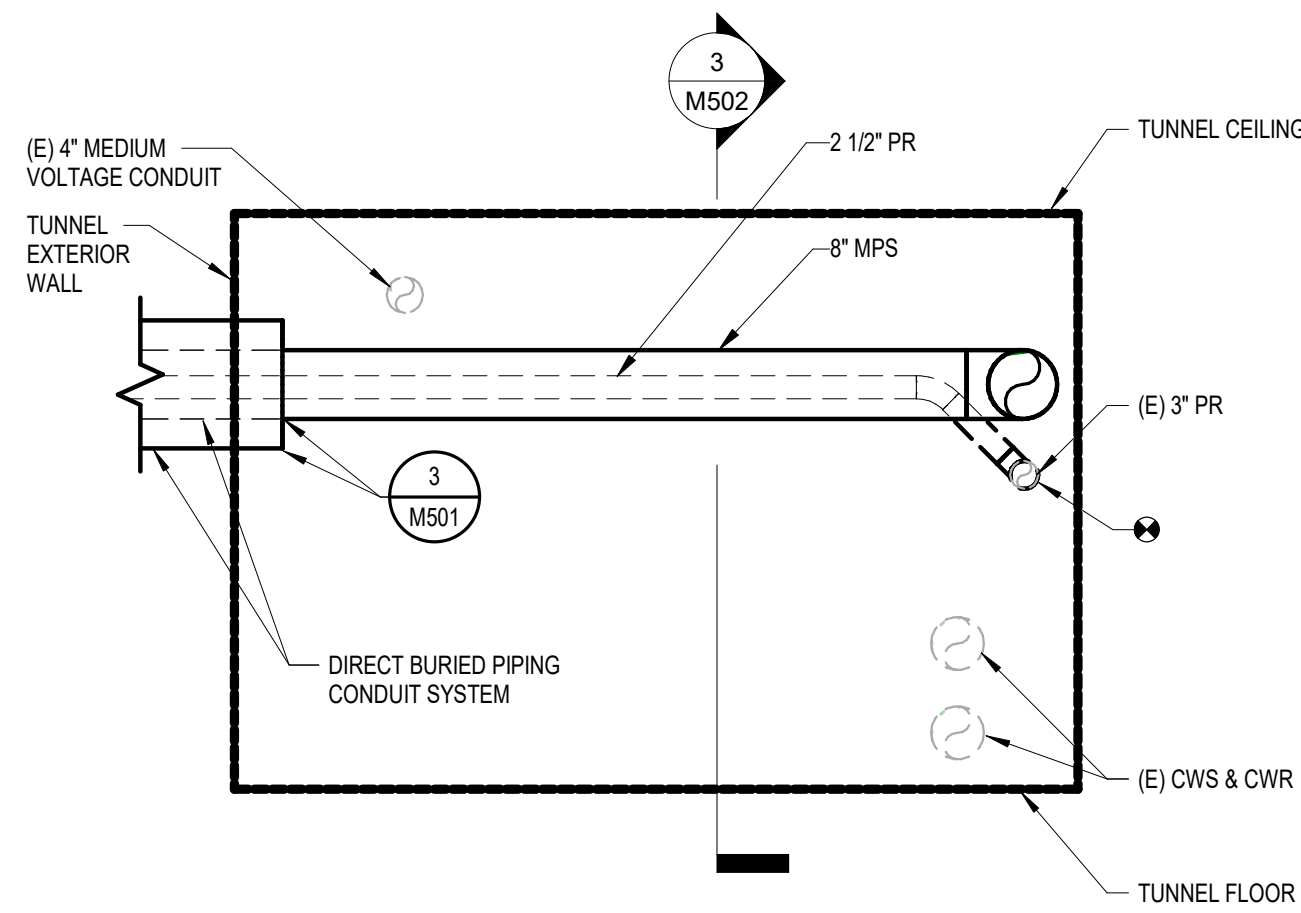
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PROJECT: Y006.03

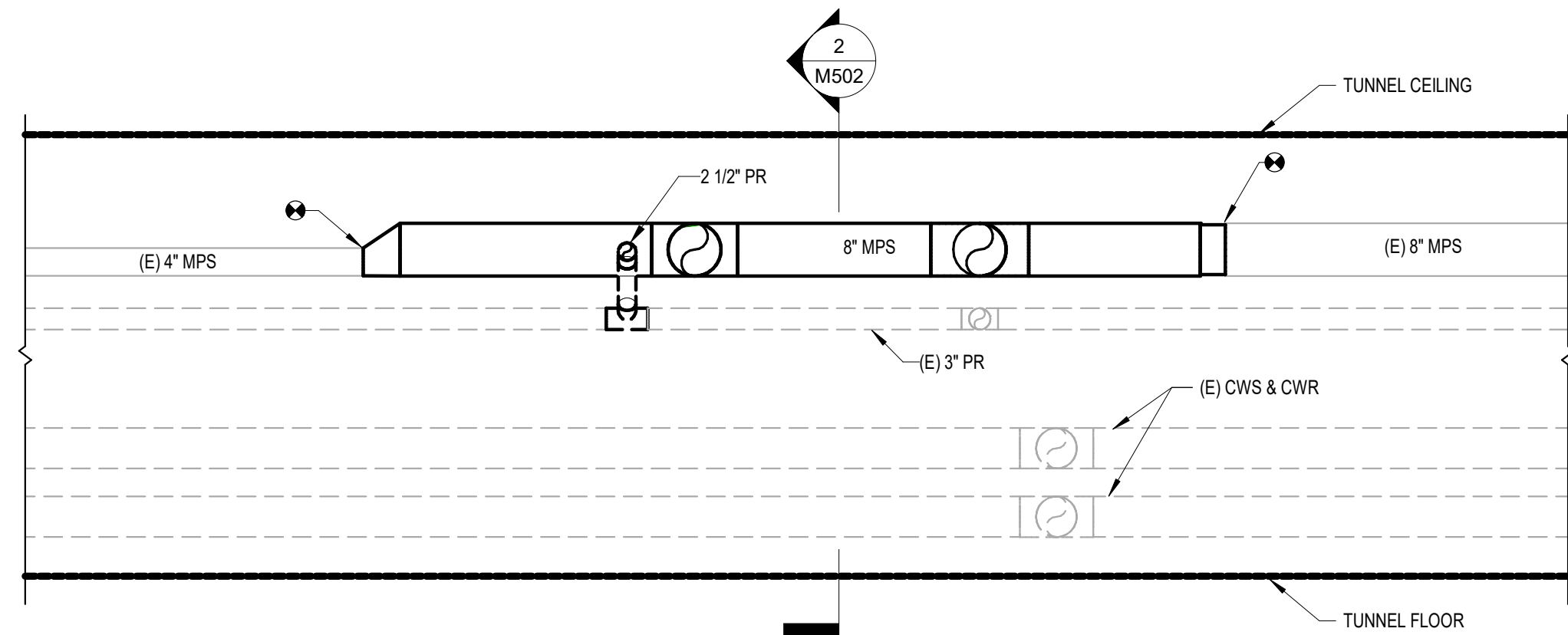
M502



1 TYPICAL VAULT
NOT TO SCALE



2 SECTION UTILITY TUNNEL WEST
1/2" = 1'-0"



3 SECTION UTILITY TUNNEL NORTH
1/2" = 1'-0"



RACEWAYS, BOXES, AND CONDUCTORS		WIRING DEVICES	GENERAL	ABBREVIATIONS
UNDERGROUND OR UNDERFLOOR RACEWAY GROUND CONNECTION CONDUIT UP CONDUIT DOWN JUNCTION BOX CONDUIT BODY CONDUIT STUB		DUPLEX RECEPTACLE LETTER DESIGNATOR(S) INDICATE ADDITIONAL RECEPTACLE CHARACTERISTICS (APPLIES TO ALL RECEPTACLE AND FLOOR BOX TYPES): A = INTEGRAL AFCI B = INTEGRAL WITH USB OUTLET(S) C = SUPPLIED POWER VIA CRITICAL BRANCH (NEC 517) E = SUPPLIED POWER VIA LIFE SAFETY BRANCH (NEC 517) G = INTEGRAL GFCI IG = SUPPLIED POWER VIA AN ISOLATED GRD SYSTEM P = INTEGRAL SURGE PROTECTIVE DEVICE S = SUPPLIED POWER VIA OPTIONAL STANDBY BRANCH (NEC 702) U = SUPPLIED POWER VIA A UPS WP = WEATHERPROOF AND INTEGRAL GFCI	MECHANICAL EQUIPMENT DESIGNATOR, SEE SCHEDULES. LAB EQUIPMENT DESIGNATOR, SEE SCHEDULES. REFERENCE NOTE MARKER PLAN OR DETAIL NUMBER SHEET NUMBER EXISTING WORK SHOWN LIGHT CONDUIT NEW WORK SHOWN BOLD EXISTING TO BE REMOVED (APPLIES TO DEMOLITION PLANS ONLY)	(#) DESIGNATES QUANTITY LV LOW VOLTAGE A AMPERE (AMP) LSI LSI ELECTRONIC TRIP UNIT AC ALTERNATING CURRENT LSVG LSVG ELECTRONIC TRIP UNIT AFC AVAILABLE FAULT CURRENT LTG LIGHTING AFF ABOVE FINISHED FLOOR MCA MINIMUM CIRCUIT AMPACITY AFGB ABOVE FINISHED GRADE MCB MAIN CIRCUIT BREAKER AL ALUMINUM MCC MOTOR CONTROL CENTER ARCH ARCHITECT/ARCHITECTURAL MDF MAIN DISTRIBUTION FRAME ATS AUTOMATIC TRANSFER SWITCH MDS MAIN DISTRIBUTION SWITCHBOARD AWG AMERICAN WIRE GAUGE MDX MAIN DISTRIBUTION PANELBOARD BLDG BUILDING MECH MECHANICAL BOCT BOTTOM OF CABLE TRAY MLO MAIN LUG ONLY BSC BIOLOGICAL SAFETY CABINET MTS MAIN TRANSFER SWITCH C CONDUIT MVA MEGAVOLT-AMPERE CENT CENTRIFUGE MW MEGAWATT CKT CIRCUIT (N) NEW CL CENTERLINE (NL) NEW LOCATION CLG CEILING NA NOT APPLICABLE CRI COLOR RENDERING INDEX NIC NOT IN CONTRACT CU COPPER PA PUBLIC ADDRESS DC DIRECT CURRENT PE PHOTOELECTRIC CELL DF DRINKING FOUNTAIN PF POWER FACTOR DW DISHWASHER PNL PANELBOARD (E) EXISTING PV PHOTOVOLTAGIC ECR ENVIRONMENTAL CONTROL ROOM PVC POLYVINYL CHLORIDE ELEC ELECTRICAL PWR POWER EMERG EMERGENCY (R) REMOVE EMT ELECTRICAL METALLIC TUBING (RL) RELOCATE FA FIRE ALARM REFL REFLECTOR FH FUME HOOD SCCR SHORT CIRCUIT CURRENT RATING FLA FULL LOAD AMPS SDP SUB-DISTRIBUTION PANELBOARD FTL FEED-THROUGH LUGS SWBD SWITCHBOARD GFCI GROUND FAULT CIRCUIT INTERRUPTER TR TAMPER RESISTANT GFP GROUND FAULT PROTECTION TTb TELEPHONE TERMINAL BOARD GND GROUND TV TELEVISION HP HORSEPOWER TYP TYPICAL IDF INTERMEDIATE DISTRIBUTION FRAME UC UNDER CABINET INC INCUBATOR UG UNDERGROUND K KELVIN UON UNLESS OTHERWISE NOTED KW KILOWATT UPS UNINTERRUPTIBLE POWER SUPPLY KWH KILOWATT-HOUR V VOLTAGE KV KILOVOLT VA VOLT-AMPERE KVA KILOVOLT-AMPERE VP VAPOR PROOF KVAR KILOVOLT-AMPERE REACTIVE W WATT LED LIGHT EMITTING DIODE WP WEATHERPROOF LM LUMENS XFMR TRANSFORMER
ELECTRICAL EQUIPMENT - PLANS		ELECTRICAL EQUIPMENT AS NOTED ON DRAWINGS SURFACE-MOUNTED PANELBOARD (120/208V) SURFACE-MOUNTED PANELBOARD (277/480V) RECESSED PANELBOARD (120/208V) RECESSED PANELBOARD (277/480V) PULL BOX, SIZE AS NOTED OR AS REQUIRED	INDICATES RECEPTACLE ROUGH-IN HEIGHT FROM AFF TO CL OF RECEPTACLE WHEN NOT AT STANDARD MOUNTING HEIGHT. INDICATES PANELBOARD AND BRANCH CIRCUIT NUMBER SERVING RECEPTACLE. INDICATES BRANCH CIRCUIT NUMBER SERVING RECEPTACLE. REFER TO SHEET NOTES AND REFERENCE NOTES FOR SOURCE.	

SHEET LIST - ELECTRICAL	
E001	LEGEND, GENERAL NOTES, SCHEDULES, & SHEET INDEX
E099	SITE PLAN
E121	FLOOR PLAN - QUINN BASEMENT
E122	FLOOR PLANS - QUINN AND HOKÉ FIRST FLOOR

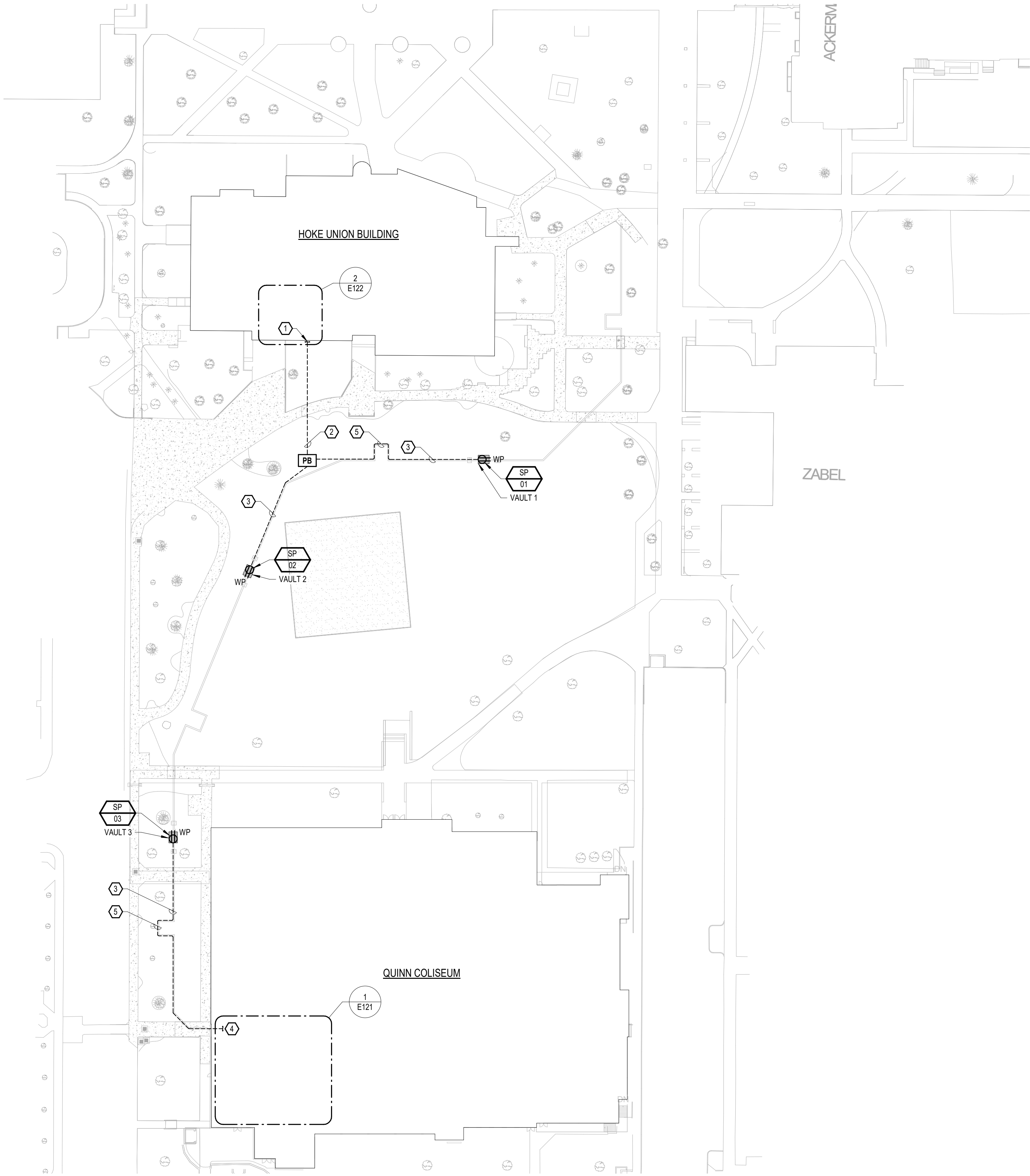
MECHANICAL EQUIPMENT CONNECTION SCHEDULE													
TAG	DESCRIPTION	VOLTAGE	PHASE	HP	KW	FLA	FEEDER DESCRIPTION	CIRCUIT BREAKER (AMPS/POLES)	PANEL IDENTIFICATION	STARTER DIVISION	DISCONNECT DIVISION	VFD DIVISION	NOTES
SE-01	SEWAGE EJECTOR PUMP	208	3	3.00		10.6	(3) 12 AWG CU, (1) 12 AWG GND. IN 3/4" C.	30/3	QUINN PNL 'EA'	NA	DIV 26	NA	1
SP-01	SITE SUMP PUMP	120	1	0.33		4.1	(2) 10 AWG CU, (1) 10 AWG GND. IN 3/4" C.	20/1	HOKE PNL '1A'	NA	DIV 26	NA	2,3,4
SP-02	SITE SUMP PUMP	120	1	0.33		4.1	(2) 10 AWG CU, (1) 10 AWG GND. IN 3/4" C.	20/1	HOKE PNL '1A'	NA	DIV 26	NA	2,3,4
SP-03	SITE SUMP PUMP	120	1	0.33		4.1	(2) 10 AWG CU, (1) 10 AWG GND. IN 3/4" C.	20/1	QUINN PNL 'AD'	NA	DIV 26	NA	2,3
CRU-02	CONDENSATE RETURN PUMP	208	1	0.50		5.4	(2) 12 AWG CU, (1) 12 AWG GND. IN 3/4" C.	20/2	QUINN PNL 'AD'	NA	DIV 26	NA	2

GENERAL NOTES:

1. PROVIDE CONDUCTORS WITH TYPE XHHW INSULATION FOR FEEDERS AND BRANCH CIRCUITS BETWEEN VFDS AND THEIR ASSOCIATED MOTORS.
2. WHERE INDICATED IN SCHEDULE ABOVE, DISCONNECTS SHALL BE FURNISHED AND INSTALLED BY DIVISION 26. COORDINATE DISCONNECT REQUIREMENTS WITH MECHANICAL.
3. AT ANY PANELBOARD WHERE WORK OCCURS, RETURN ANY CIRCUIT BREAKERS FOUND NOT IN USE TO THE 'OFF' POSITION AND AND PROVIDE NEW PANEL SCHEDULE IDENTIFYING ALL LOADS AND SPARES.

NOTES:

1. SERVE PUMP FROM EXISTING BRANCH CIRCUIT PREVIOUSLY SERVING DEMOLISHED PUMP. REFER TO FLOOR PLANS.
2. PROVIDE NEW BRANCH CIRCUIT INCLUDING NEW CIRCUIT BREAKER AT SIZE INDICATED IN PANEL INDICATED. REFER TO FLOOR PLANS.
3. EQUIPMENT IS CORD AND PLUG CONNECTED. COORDINATE CONNECTION REQUIREMENTS WITH EQUIPMENT SUPPLIED PRIOR TO COMMENCING WORK.
4. REFER TO SITE PLAN FOR CONDUIT SIZING REQUIREMENT WHERE MULTIPLE BRANCH CIRCUITS SHARE A SINGLE CONDUIT.



- SHEET NOTES:**
1. SAW CUT EXISTING ASPHALT AND CONCRETE PAVING AND EXCAVATE FOR PLACEMENT OF NEW POWER PATHWAYS AT MINIMUM 12" BELOW FINISH GRADE. PATCH PAVING AND RESTRIPE AFFECTED AREA TO MATCH EXISTING.
 2. LOCATIONS SHOWN ARE APPROXIMATE AND ARE DIAGRAMMATIC IN NATURE. CONTRACTOR SHALL COORDINATE ALL LOCATIONS AND ROUTING WITH OWNER AND WITH OTHER TRADES PRIOR TO COMMENCING WORK.

- REFERENCE NOTES:**
- 1 CONTINUES TO PANELBOARD. REFER TO 2/E122.
 - 2 PROVIDE 1" C. FROM BUILDING TO PULL BOX.
 - 3 PROVIDE 3/4" C. IN TRENCH NEXT TO MECHANICAL. COORDINATE WITH MECHANICAL PRIOR TO ROUGH-IN.
 - 4 CONTINUES THROUGH (E) STEAM TUNNEL. REFER TO 1/E121.
 - 5 ROUTING INDICATED FOLLOWS STEAM PIPE EXPANSION LOOP. COORDINATE ELECTRICAL PATHWAY ROUTING WITH OWNER AND OTHER TRADES PRIOR TO COMMENCING WORK.



EOU WEST STEAM

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SITE PLAN

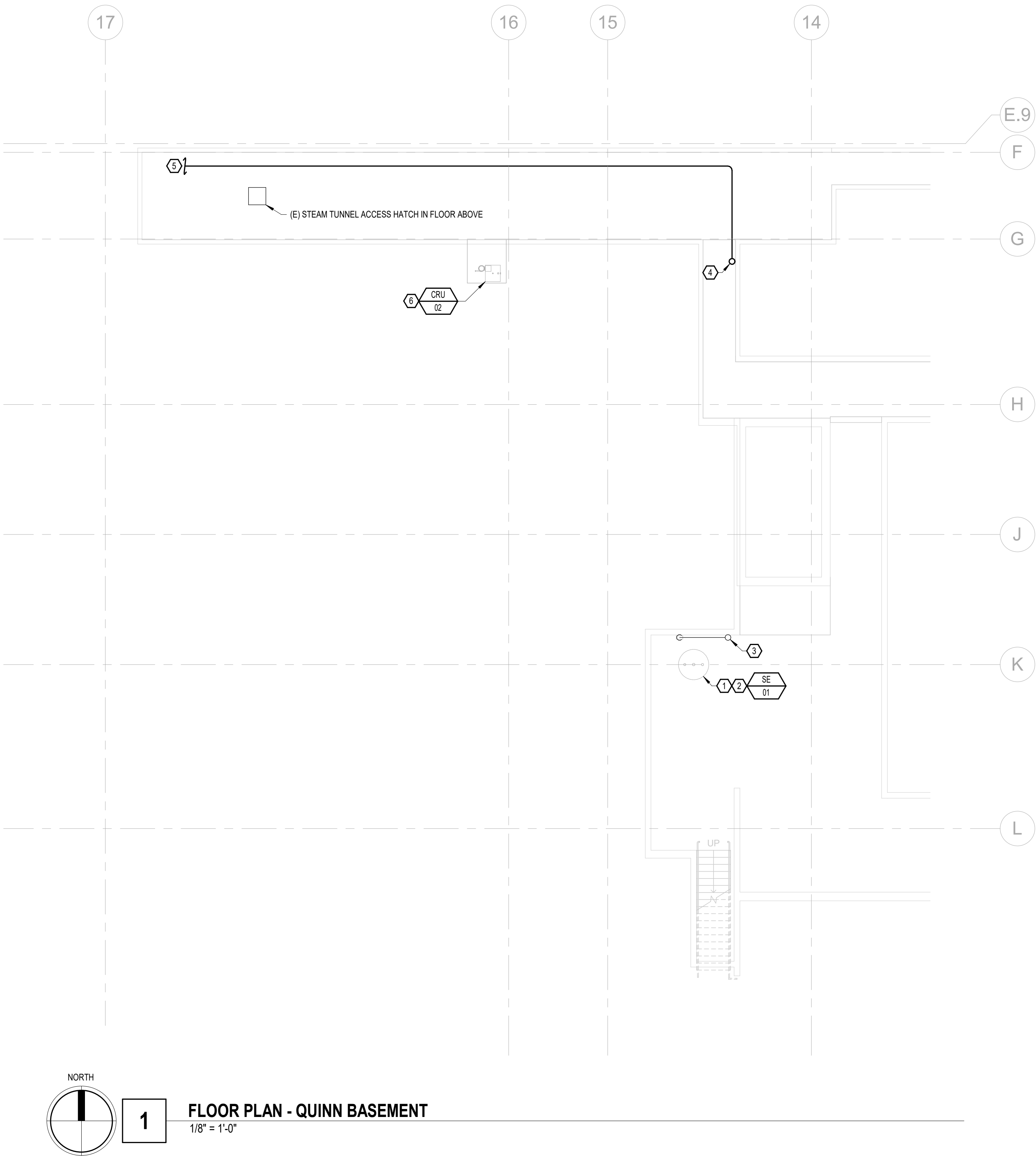
MARK	DATE	DESCRIPTION

DESIGNED: AJW
DRAWN: AJW
CHECKED: MBR

DATE: 01.23.2026
PROJECT: Y006.03

E099

1/23/2026 4:20:33 PM
PLOTTED BY AJW ON:



SHEET NOTES:

- LOCATIONS SHOWN ARE APPROXIMATE AND ARE DIAGRAMMATIC IN NATURE. PANEL AND BRANCH CIRCUIT INFORMATION IS BASED ON LIMITED SITE VISITS AND EXISTING PANEL SCHEDULES. CONTRACTOR SHALL COORDINATE ALL LOCATIONS AND ROUTING WITH OWNER AND WITH OTHER TRADES PRIOR TO COMMENCING WORK.
- REFER TO 1/E099 FOR CONDUIT SIZING.

REFERENCE NOTES:

- DISCONNECT EXISTING PUMP TO BE DEMOLISHED. RETAIN AND PROTECT BRANCH CIRCUIT WIRING FOR RECONNECTION TO NEW PUMP OF SAME TYPE AT SAME LOCATION.
- CONNECT NEW PUMP TO BRANCH CIRCUIT WIRING PREVIOUSLY SERVING DEMOLISHED PUMP. COORDINATE CONNECTION REQUIREMENTS WITH EQUIPMENT SUPPLIED PRIOR TO COMMENCING WORK.
- (E) CONDUIT CONTINUES TO (E) PANELBOARD IN ELECTRICAL ROOM ON FIRST FLOOR. REFER TO 1/E121.
- (N) CONDUIT TO SERVE SP-03. ROUTE (N) CONDUIT THROUGH (E) STEAM TUNNEL.
- CONDUIT CONTINUES TO VAULT. REFER TO DETAIL 1/E099.
- DISCONNECT EXISTING PUMP AND DEMOLISH CONDUCTORS BACK TO SOURCE. PROVIDE NEW WIRING TO SERVE NEW PUMP AT SAME LOCATION. REFER TO MECHANICAL EQUIPMENT CONNECTION SCHEDULE AND COORDINATE CONNECTION REQUIREMENTS WITH EQUIPMENT SUPPLIED PRIOR TO COMMENCING WORK.



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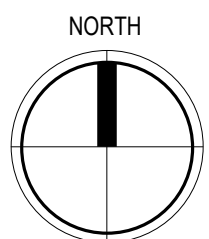
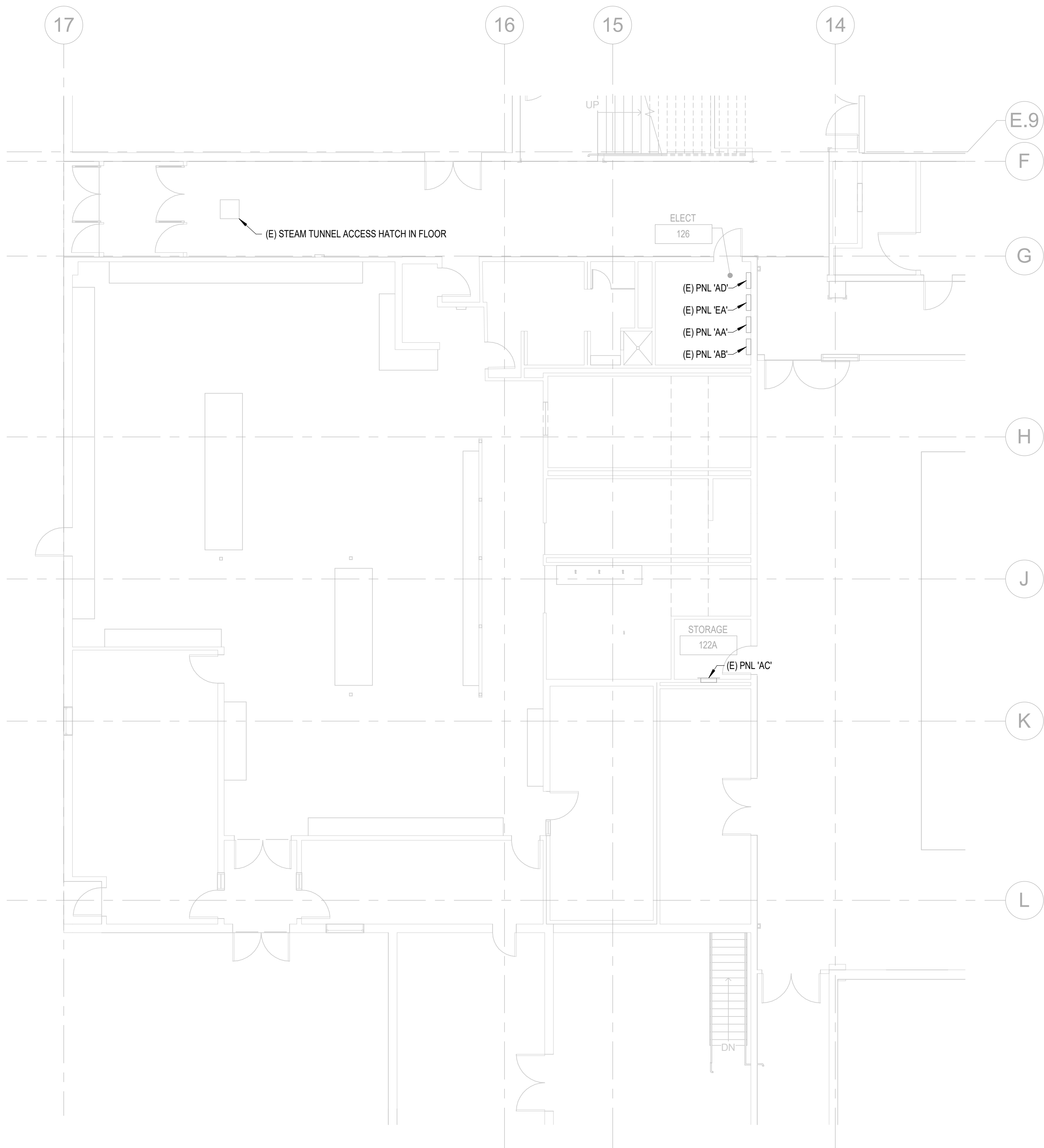
FLOOR PLAN -
QUINN BASEMENT

MARK	DATE	DESCRIPTION

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CHECKED:	MBR

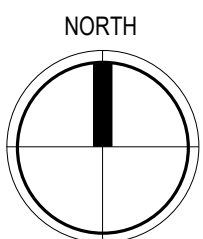
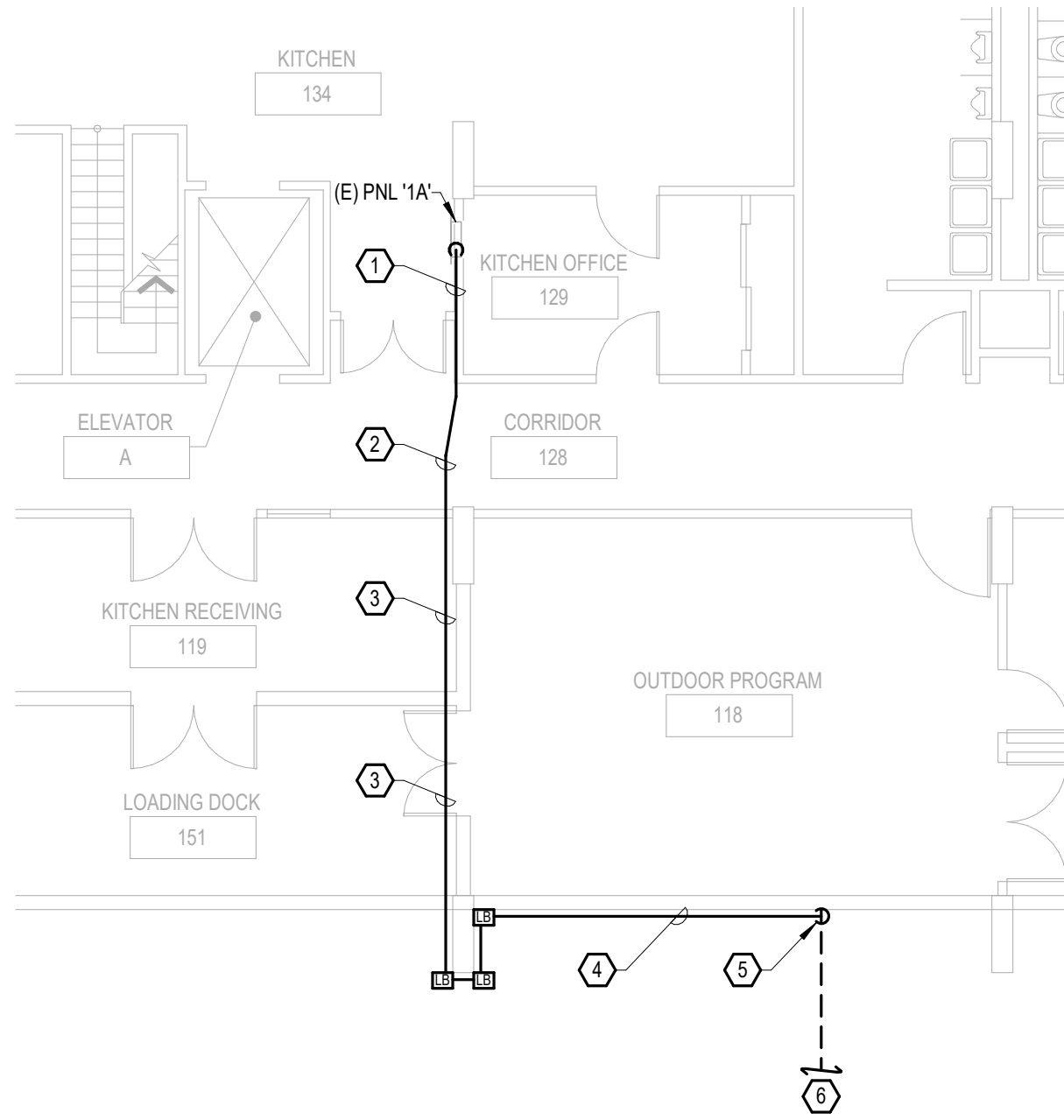
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E121



1

FLOOR PLAN - FIRST FLOOR - QUINN COLISEUM
1/8" = 1'-0"



2

FLOOR PLAN - FIRST FLOOR - HOKE UNION BUILDING
1/8" = 1'-0"

SHEET NOTES:

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2. REFER TO 1/E099 FOR CONDUIT SIZING.

REFERENCE NOTES:

1. ROUTE CONDUIT ABOVE ACCESSIBLE CEILING IN KITCHEN.
2. CONDUIT CONTINUES OVER HARD LID CEILING IN CORRIDOR.
3. ROUTE CONDUIT TIGHT TO STRUCTURE ABOVE.
4. ROUTE HORIZONTAL CONDUIT AS HIGH ON EXTERIOR WALL AS PRACTICAL. UTILIZE CONDUIT BODIES AS NECESSARY TO FACILITATE TIGHT FIT AGAINST EXTERIOR SURFACES. COORDINATE CONDUIT ROUTING AND LOCATION OF PENETRATIONS WITH OWNER PRIOR TO COMMENCING WORK.
5. PROVIDE VERTICAL CONDUIT DOWN EXTERIOR WALL.
6. CONDUIT CONTINUES UNDERGROUND. REFER TO 1/E099.



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FLOOR PLANS - QUINN AND HOKE FIRST FLOOR

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E122